

# The Mining And Metallurgical Journal

VOL. XIX. NO. 3

LOS ANGELES, CAL.,

May 1, 1898,

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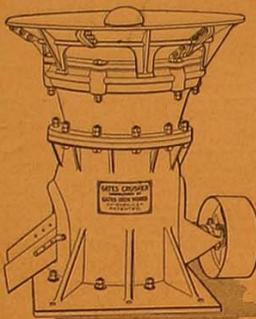
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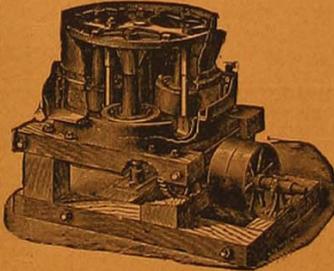
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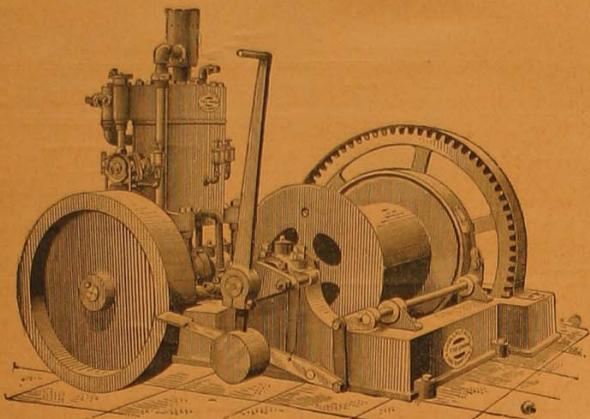
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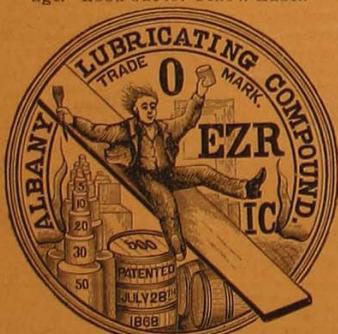
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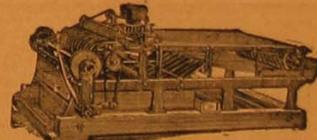
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A	E	L	S	
Abbott, W. O.	23	Elmer & Amend	4	
Actna Powder Co.	4	Ellis, H. R.	21	
Agramonte, C. H. M. y.	30	Ellis, S. H.	30	
Ainsworth, Wm. M.	29	Emanuel, Wm. H.	2	
Albuquerque Foundry & Machine Works	24	Eynon-Evans Manufacturing Co.	26	
Allis Co., Edward P.	1			
Altendorf & Sons, Theo.	25			
American Diamond Rock Drill Co.	20	Fauth & Co.	27	
American Zinc Lead Co.	19	Fay & Eagan Co., J. A.	28	
Aubury, L. R.	19	Ferrari, Guido.	28	
Axelson Machine Co.	30	Fish, A. L.	30	
B	F	G	M	
Bailey, A. A.	24	Flint & Lomax.	28	
Baker & Adamson Chemical Co.	18	Foot, Dr. A. E.	4	
Baker & Co.	20	Fossil Meat Co.	17	
Baker & Hamilton	22	Fowler, G. C.	30	
Baker Iron Works	32	Fulton Engine Works.	20	
Baker Co., Henry Carey	21	Fraser & Chalmers.	19	
Bennet L. Willard	1	Frese, Adolf.		
Beeckley & Co., A. J.	17	G		
Bell, Newton M.	21	Garburt, F. C.	3	
Bi Metallic Assay Office	22	Garratt & Co., W. T.	27	
Bickford Drill Co.	23	Gates Iron Works.	1	
Blake Mfg Co. Geo. F.	24	Giant Powder Co. Con.	25	
Borden, Gail.	4	Glanding Co., James	28	
Booth & Co., C. B.	31	Goldsmith Bros.	27	
Boston & Fantasma Milling and Mining Co.	19	Goodyear Rubber Mfg Co.	4	
Bradley-Ramsey Lumber Co.	22	Graphite Lubricating Co.	18	
Bradley Pulverizer Co.	6	Grimwood Chas P.	17	
Brandt & Son, F. E.	21	Gutta Percha Rubber and Mfg Co.	23	
Brown, M. E., Horace F.	22	H		
Burn & Berger.	22	Hamlin & Morrison	27	
Burnell Mfg Co., M. C.	5	Hanford Iron Works.	22	
Burbridge, S. L.	27	Hassell Iron Wks Co.	22	
Burke, T. J.	30	Harrington & King Perforating Co.	6	
Burlingame, E. E.	24	Harper & Reynolds Co.	1	
Burlingham, N. D., M. E.	19	Hawley & Co., J. B.	22	
C	I	J	O	
Caldwell Bros.	21	Heckelmann and McCann.	29	
Cal Bellows Mfg Co.	24	Hendy Machine Works, Joshua.	24	
California Perforating Screen Co.	25	Hendrie & Boltzoff Manufacturing Co.	25	
California Wire Works.	29	Henry & Co., Norman C.	26	
California Vigorit Powder Co.	2	Henshaw, Bulley & Co.	5, 22, 23, 24, 25	
Chapman Smelting Works Co.	24	Hersey, Clarence.	27	
Charleson Percy, W.	28	Heer, Peter.		
Chester Steel Castings Co.	22	Hoff Asbestos Mfg Co.	23	
Chicago & Aurora Smelting & Refining Co.	28	Hopping, Roy.		
Chicago School of Assaying	21	Hoskins & Co., Wm.		
Chrome Steel Works.	21	Howe, Frank H.		
Coates, H. P. G.	20	Hubbard, W. R. & Co.		
Colburn, Richard L.	30	Hubbell & Longyear.		
Colorado Iron Works.	23	Hunt, Fred, F.		
Com. Soc. Adanor	2	I		
Colo. and Cal. Mineral Development Co.	4	Imperial Chemical Co.	22	
Compania Industrial Mexicana	26	Incorporated Mines Paying Dividends.	20	
Conway & Co., P. J.	28	Ingersoll, Sergeant Drill Co.	19	
Consolidated Pipe Co.	4	J		
Con. Kansas City Smelting & Refining Co.	1	Jackson Drill and Manufacturing Co., The.	26	
Corliss, E. M.	27	Jardine, J. B.	17	
D	K	Jeffrey Manufacturing Co.	24	
Dame, W. E.	18	Jehu, W. N.	2	
Daniel, C. A.	28	Jessops Steel Co.		
Davis Industries Co., F. M.	1	Johannesburg Sampling Works.	18	
Deegan, L. P.	17	Jones & Jones.	30	
Desistison, E. G.	25	Judson, A. F.	18	
Denver Fire Clay Co.	27 & 29	R		
Denver Public Sampling Wks.	30	Reed, John T.	18	
Dec & Co., Thos. J.	30	Read, Edward B.	21	
DeSolla Deussing Co.	25	Ready Rock Asphalt Roofing Co.	24	
Dickman & Mackenzie	3	Rickets & Banks.	5	
Dixon Crucible Co., Jos.	1	Ridson Iron Works.	31	
Drake, Dr. W. F.	21	Roesler & Hasslacher Chemical Co.	1	
Dredging & Mining Machinery Co.	28	Robins' Conveying Belt Co.	21	
Ducommun, C.	23	Rogers & Baldwin.	24	
E	Krogh Manufacturing Co.	19	Russell & Co.	18
		Russell, W. A.	30	
F	L	Queen & Co.	24	
F. C. Garbutt		R		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
G	M	Q		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
H	N	R		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
I	P	Q		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
J	R	Q		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
K	S	R		
		Reed, John T.	18	
		Read, Edward B.	25	
		Ready Rock Asphalt Roofing Co.	24	
		Rickets & Banks.	5	
		Ridson Iron Works.	31	
		Roesler & Hasslacher Chemical Co.	1	
		Robins' Conveying Belt Co.	21	
		Rogers & Baldwin.	24	
		Russell & Co.	18	
		Russell, W. A.	30	
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		Stockton Assay Office.	28	
		Surman & Co., J. H.	5	
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		Taylor Iron and Steel Co.	6	
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		Tremaine & Froehlich.	24	
		Trenton Iron Co., The.	21	
		Troemner, Henry.	24	
		Truxa Manufacturing Co.	5	
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		Taylor Iron and Steel Co.	6	
		Thomson & Boyle.	2	
		Tomlinson, J. B.	5	
		Townsend Bros.	18	
		Tremaine & Froehlich.	24	
		Trenton Iron Co., The.	21	
		Troemner, Henry.	24	
		Truxa Manufacturing Co.	5	
O	U	V		
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		Van Der Naillen, A.	5	
		Van Osdol, E. B., A. M.	18	
		Van Nostrand Co., D.	4	
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Q	Y	Z		
		Wade & Wade.	18	
		Warren, A. A.	18	
		Washington Machinery Depot.	2	
		Watson, R. N.	32	
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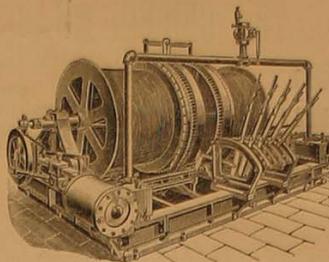
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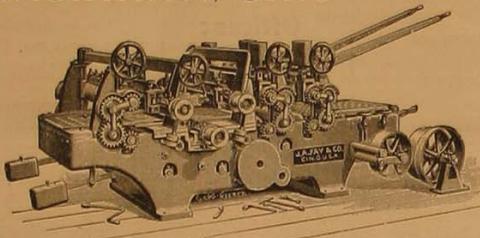
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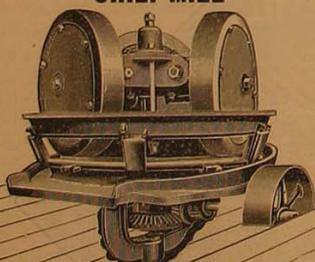
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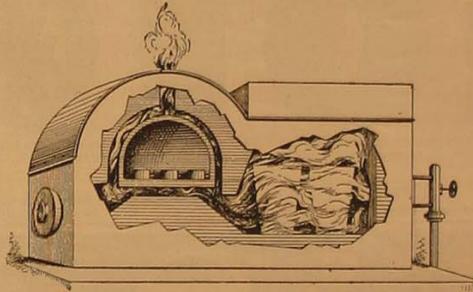
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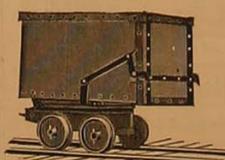
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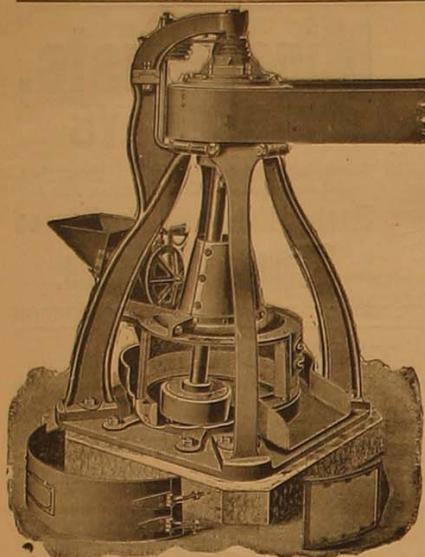
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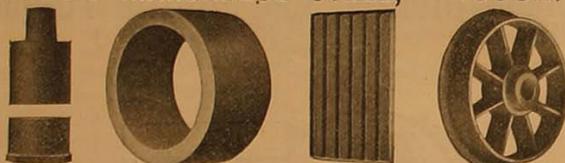
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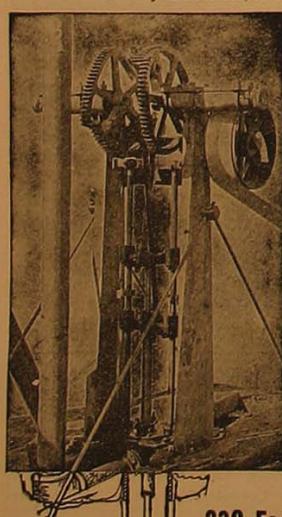
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# The Mining And Metallurgical Journal

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CUBAN WAR AND MINERAL RESOURCES.

The island of Cuba, which is the chief colonial possession of Spain, has attracted more than ordinary attention for the past three years, on account of the uprising of the Cuban inhabitants against the misrule of Spain. The Spanish government has always impressed a high rate of taxation on both imports and exports, and the inhabitants have time and again appealed to Spain, and have always been refused redress. Rebellion has followed rebellion, for the last half century, until the island is groaning under the heavy burden of debt, which Spain has heaped on the finances of the once rich, but now unfortunate people.

The peculiar geographical condition of the country requires to be understood to appreciate the true conditions of the island, which is divided into two portions from that natural cause. A belt of low or comparatively flat land extends along the coast line, with a few valleys extending into the interior mountains, which form a high or elevated plateau on the top. The Spanish forces occupy the coast region and cities and harbors, while the Cubans hold possession of the interior mountain passes and hill region and are independent of the coast for food supplies, but have been blockaded, as it were, from the necessary stores and munitions of war, which were only obtainable from the sea board.

The Spaniards, finding it impossible to conquer the Cubans and take the interior mountain fastnesses, resorted to a policy of wanton destruction under General Weyler, (the Butcher), of the rich sugar and coffee plantations, and drove the non-combatant population into the cities and towns. Being without means of support, these unfortunate people, who are mostly women and children, have died from starvation and want of food, to the reported number of from 400,000 to 500,000, simply for the reason that they were deprived

of the liberty of cultivating their land. This deplorable condition went on from bad to worse until the climax was reached when a few months ago the U. S. battleship Maine, while lying at anchor in the harbor of Havana, was blown up by a submarine mine, placed there under the direction of the Spanish General Weyler, and which resulted in the murder of 269 U. S. officers and marines. The righteous indignation of the American people forced our Government to intervene and demand the freedom of Cuba, but as Spain would not grant this, war has been declared.

As the result will eventually end in the freedom of Cuba, the mineral resources of that island are of special interest. The rich soil and tropical climate of Cuba produced of agricultural products annually, of sugar, coffee, tobacco, cattle, etc., exports to the extent of \$85,000,000. The mineral exports amounted to \$3,500,000 yearly, and formed the second largest product. The Province of Santiago de Cuba possesses large and rich deposits of magnetic and hematite iron ore, and the manganese deposits are in proportion equally as rich and extensive. The copper deposits of Cuba were operated some thirty years ago by British capital, but excessive export duties forced the companies to abandon the works, and they have since remained idle. The history of the mineral development of Cuba is one of oppressive misrule, due to excessive expert duties and bribery of Spanish officials, and not the enriching of the island's revenues. For this reason, as well as the cause of humanity, the present war is a righteous act.

MINING DISTRICT RECORDS AND RULES.

The California state mining law, of 26th May, 1897, called for the return of the books and records of the state mining district recorders to the custody of the county recorders, thereby dispensing with the services of the district mining recorders. That clause is said to be in conflict with the Federal mining law, as stated in Section 392: "The miners of each mining district may make regulations not in conflict with the laws of the state or territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements, etc."

Judge Virden of Mono County, California, was reported in the *Mining and Scientific Press* as giving a decision against the recent state mining law, abrogating mining district recorders. Also, that Attorney-General Fitzgerald, of California, claims that a state law or a local regulation is void which requires any work to be done upon mining claims other than that demanded in the Federal statutes.

Judge Olin Wellborn, the Circuit Judge in the United States Court in Los Angeles, last week rendered an important opinion on the legality of mining district rules and regulations, as provided for in the Federal statutes before mentioned, in the suit of Northmore vs. Simmons, in the Mojave mining district, which required locators of mining claims to sink a shaft or run a tunnel ten feet, within ninety days after the location of claims. Northmore made a location, called the Vivian, but failed to do any work within ninety days, as required by the local rules and regulations of the district. A re-location of the same ground was thereafter made by the defendant, Simmons, on the reason that Northmore's location had lapsed and become void, by his

failure to do the required work. Northmore filed suit in the U. S. Court, claiming that such a local rule or regulation was in conflict with the Federal statutes, which only required \$100 worth of annual assessment work. Judge Wellborn decided against Northmore, and ordered his bill of complaint dismissed. The plaintiff has given notice of appeal to the United States Circuit Court of Appeals. The question involved in this case seems to be: Has the state law of 26th May, 1897, the power to annul and declare void the acts and records of the mining districts, and in forcing locators to record in the County Recorder's office, when the Federal law says each mining district may make regulations as before quoted? It would appear that the decision of Judge Wellborn is right, for the plaintiff neither complied with the state law nor with the district regulations, and, disregarding both, holds that the Federal law alone is in force.

HISTORY OF MINING PROSPECTS.

The mining industry is singularly peculiar in the instance that it is one which writes its own history on the world's page of social progress. From the earliest times and down through the ages to the present date this fact holds good, both in the old and new worlds. The prehistoric operation of ore bodies in early and modern times is an interesting branch of the geologists' work, and the records made show the advances accomplished as well as the failures made. Every prospect shaft or tunnel stands as a monument of success or failure. The permanent marks thus made tell in the future for or against the industry, unless obliterated or filled up, which circumstance rarely happens. It is this lasting evidence of mining operations which is so often pointed to as being due to the risk and speculative nature of the mining industry, when at this date uncertainty only belongs to the prospect and early stages of discovery and exploitation in the operation of a properly managed mine.

In our cities and towns or even in agricultural life, there is no such record left of the many failures in all lines of trade and in the professions, except in the instance where a church is converted into a store, or laundry, or put to some other use than regenerating the morals of its members. A party goes into business and makes a failure, and in a few months another takes his place in the same or another line of trade, and all evidence of the failure is gone, but the unsuccessful prospector, who sinks a test pit or drives a tunnel, is not always so fortunate as to have his failure jumped by a party with more capital or courage, and leaves behind him lasting evidence of his work and misfortune. Instances are common where a prospector expected to discover one mineral and, quite unknowingly, he was mining another of equal or more value from that which he expected, or he was told so by some one with more knowledge of ores or minerals of the value of his discovery.

The mining industry, even in its prospecting stage, is not attended with greater risks (when the operation is conducted by a miner or prospector of experience and intelligence) than the risks taken in trade or business, although from the facts before mentioned, the history of the failures is written on the page of nature in a lasting and permanent way, which makes them appear more numerous than they really are in proportion to ordinary trade risks and failures.

### SALE OF MINES AND PROSPECTS.

There is a common cry among the daily newspaper writers of mining paragraphs, for the curtailing of the operations of middle-men in the sale of mines, between buyer on the one hand and owner on the other. The object aimed at is to bring the buyer and seller together and save the middle man's commission.

The business of the mining engineer is to report on mines and prospects for purchaser or owner, and often to find the capital required to extend the industry, as well as the active operation of mines, and the milling and smelting of ores, and, incidentally the sale of mines and prospects. His legitimate work in these directions is largely interfered with by a class of real estate men, broken-down lawyers who pose as experts, and others, whom the writers referred to have just cause of complaint. This class of financial failures are the parasites who live on the back of the mining industry, and for the benefit of which it would be well if the industry could be protected from their operations. In the Western States they are more numerous than in the east, where the services of the mining engineer of integrity, experience, and honest dealing is consulted by both buyers and owners of mining property. As the advertising columns of all mining papers contain the business cards of such parties, there is no excuse for consulting or placing mining property in other hands for sale. The common error complained of is, in deceiving the owner and injuring the district by loading the price of the property to such an extent that it will not sell, or at which it would be impossible for it to pay dividends on the inflated value placed upon it by the inexperienced or over zealous middleman. Unfortunately for the industry, there is too just cause of complaint in these cases, as the owners readily become a party to it, in the desire to get all they can for what they have to sell. They ought to remember that capital is not tied to any country, state or district, and demands investment in any enterprise which will pay dividends on the amount invested. The days are long past when an owner's statement is taken, without due investigation and trial or careful working tests made of the property offered, to satisfy the intending purchaser that the enterprise will pay interest on purchase price and capital, and that the ore reserves are sufficient to warrant the purchase.

### INCREASE THE WATER SUPPLY.

The past winter has been what is known as a dry year, due to a small rain fall in the valleys and snow fall in the mountains. The effect of this has been to greatly stimulate the demand for pumping plants, gasoline engines, and pipe lines, etc., and to increase generally the area of irrigation operations where formerly rain was depended on.

THE JOURNAL has time and again advocated the extensive construction of storage reservoirs in the mountain canyons, to prevent the winter rain fall from being lost, as is the case in far too many instances at the present time.

The city council of Los Angeles is looking to increase the domestic water supply in the near future, and a committee appointed to investigate that important matter, has reported most favorably on a system of storage reservoirs to be built in the Big Tejunga Canyon, some 25 or 30 miles north of the

city, which will furnish the district and city with a large supply of pure mountain water, by gravity pressure from this admirable and convenient mountain source. It is the intention to have the whole work undertaken as a municipal operation, as it ought to be, and as the necessity and extent of the enterprise demands.

The chief work of the supervisors in all southern counties and desert districts ought to be directed to a large extent in the same direction in the storage of water to supply water for irrigation, mining and domestic use in the vast arid region of the south-western states. The subject is too large and important to the interests of the whole country, and the mining industry especially, to leave it to the efforts of private incorporations to undertake.

The example in this direction of the Australian colonies, in issuing bonds for the prosecution of exactly similar undertakings, under climatic conditions the same as exist in the southwestern states, is an example worthy of being followed, and if possible made more extensive, as a necessary part of the state government policy. To neglect it is to disregard the highest interests of the people of Southern California, Utah, Nevada, Arizona, New Mexico, Southern Colorado, Texas and portions of adjoining states. As a means of increasing railway traffic it cannot be over estimated, for by it alone can the country be made fit for settlement to an extent only proportionate with the increase of the water supply.

The drought of last winter and the condition of low water in mountain streams render the present time a most opportune chance to accomplish the construction of storage dams, at the least possible cost and danger from washouts by high water in the streams. The time for our state, county and municipal authorities to act in this matter was never more urgent than at present, and to neglect the trust placed in them by the people of the districts, for both the mining and irrigation interests.

### Mineral Display.

An effort is now being made by the commissioner of the Trans-Mississippi Exposition towards the collection of the various minerals found in Southern California and its display at Omaha in June.

Too little attention is given to the matter by those to be mostly benefitted. The benefits that will accrue from a good mineral display cannot be over-estimated, and it should be the duty of our miners to at once give the matter their earnest attention, and aid the commissioner in every manner possible towards the collection.

Space has been allotted to us sufficient to make a good showing. The railroads have offered to carry the ores free of all charge, and it only remains for the miner to carry out his part of the programme.

Much of the activity of our northern counties has been brought about by frequent displays of their mineral resources, and it behoves us of the south, if we are to progress in like ratio, to adopt the same means as our northern brothers.

To arouse interest in our mines, a display of ores might be likened to a display of our citrus fruits. When brought before the general public, an interest is at first awakened, then an investigation, and at last an investment. In the east and middle west, Southern California is generally known as an

orange-raising country, and it will be known as such until the mineral sections are more generally advertised. Over three-fourths of the state south of Tehachipi lies within mineral zones, yet the general impression of eastern and foreign investors is that we produce nothing but oranges and climate. How else are we to impress upon them the mineral wealth within our borders except by displays similar to the one proposed? While we are awaiting the capitalist to seek us out, other localities more progressive are showing their products and gathering in the investors.

Should the miners take the desired interest, there is no question of our being able to make a display which will compare favorably with any exhibit in the west. This exhibit, after being viewed at Omaha, could be returned and placed at some central point in Los Angeles, and be made a permanent one. San Francisco is favored by the State Mining Bureau, which very few tourists fail to view, and there is not in my opinion any reason why Los Angeles should not maintain at least a fair sample of the mines in its vicinity, and devote as much attention to mines and minerals as to other resources.

An effort is now being made to raise sufficient means in this city to send out a representative to visit as many of the mining camps as the time will allow, to collect samples for the Exposition, and it is to be hoped that all interested in the matter will send their hearty co-operation.

LEW. E. AUBURY.

LOS ANGELES, April 26, 1898.

### Electricity in Belts.

Some time since an engineer in a large factory called the attention of a visiting expert electrician to the electricity in a big driving belt, and was quite surprised when the expert informed him that the electricity was caused by the belt slipping. The expert added that it was simply a wasting of power and could be prevented by applying Dixon's Traction Belt Dressing, made by the Joseph Dixon Crucible Co., Jersey City, N. J. This dressing was applied and the electricity disappeared at once. Electricity in belts is not only a waste of power, but is also an element of danger by fire.

The Connellsville *Courier* has just issued a souvenir edition, published with special reference to the Connellsville Coke Region, its past, present and future, its position, importance and magnitude in the world of fuels, superiority of the product, wide market afforded, together with descriptions of allied interests, etc.

The edition is well gotten up and printed on fine book paper, illustrated with an elegant selection of half tone views of coke ovens, mines, machinery, etc.

The *Courier* is the recognized organ of the Connellsville coke trade and has labored earnestly since 1879, when the paper was founded, to advance its interests, and this effort is only in line with what it has been doing since the days when the region was young.

The Old Jordan & Galena Mining Co., Salt Lake City, Utah, have placed an order with the Colorado Iron Works Co. for machinery for a dry crushing plant, consisting of 42" taper, cast iron dryer, rolls, ore breakers, feeders, etc.

The Colorado Iron Works Company of Denver, Colorado, received an order from John A. Moore for one water jacket smelting furnace, to be erected in the San Juan district.

## THE MURPHY PROCESS.

Gold is found in ores of two kinds, which are known as "free-milling" ores and "refractory" ores. What are called the "refractory" ores of gold are such as contain gold sparsely disseminated throughout their bulk, mechanically surrounded or enveloped by baser material, or so united with other elements as to form chemical combinations therewith. Such ores, among others, are those which contain galena, zinc-blende, iron pyrites, white iron, (arsenical) and the ores of copper. The free-milling ores have a large percentage of their gold in a finely-divided, flake, molecular or flour state, and much of this flour-gold is wasted or lost in the process of milling, either being carried away by the force of the water necessarily used in connection with the stamp mill or remaining unreleased from the rock or gangue and being rejected therewith. The stamp mill, which can be used only with free milling ores, is necessarily wasteful of a large percentage of

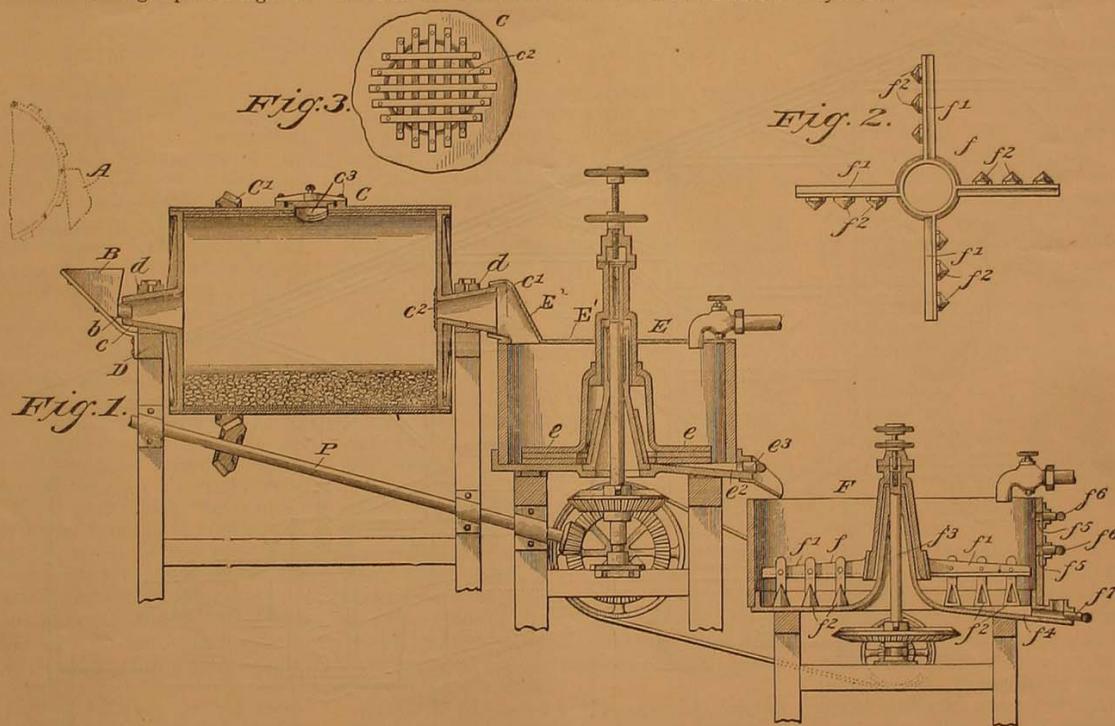
While it may not be absolutely true that gold is chemically united with baser elements in all of the refractory ores, it would seem to be true that in some of them at least there is a quasi-chemical union existing between the gold and some one or more of the other elements or combinations of elements. Whatever the real nature of the union may be, the fact is known to all practical mining engineers and chemists that from some ores fairly rich in gold it is impossible to get reasonable returns except at great expense for transportation and smelting, whereby their commercial values are destroyed. It was discovered that all of these ores may be profitably milled by reducing the entire body of gold-bearing ore uniformly and completely to an impalpable powder by gentle attrition and treating this for the separation of gold by amalgamation.

That extreme comminution or progressive subdivision of a compound substance, mechanically, will produce chemical change may or may not be true, but it is certain that such extreme comminution renders chemical

prepare the mass for new chemical combinations, so that uncombined gold may the more readily be taken up and amalgamate with mercury, and gold in combinations with the minute particles will the more easily leave these combinations to form a new one by amalgamation.

In practice it is found that ore powders passing through screens having from one to three hundred meshes to the linear inch, are sufficiently fine, but finer states of division may be obtained, and may be necessary with some ores.

We illustrate the apparatus in the accompanying drawings, in which like letters of reference indicate corresponding parts, and in which—Figure 1 is a view of the essential portions of the apparatus as seen in vertical section, the figure being in the nature of a diagram. Figure 2 is a view showing in detail one of the parts, and Figure 3 is a view showing in detail the guards or gratings used to prevent the outflow of the pebbles from the cylinder.



THE MURPHY PROCESS PLANT.

flour gold, and the smelting processes heretofore used in reducing refractory ores are expensive. In other words, ores do not in practice yield the quantities of gold which careful chemical analyses show them to contain, or if they do, the cost of getting the gold exceeds its value. A method or process of recovering the gold from all such ores has been invented, and an apparatus or arrangement of machinery whereby this process may be made effectual, and the method and apparatus are applicable as well to refractory as to free-milling ores. It has been found by actual experience and by practical exploitation of this invention that, so far as results go, it is immaterial whether the gold in ores such as have been mentioned is united to other elements chemically, mechanically or otherwise, the point of this discovery being that the gold may be recovered completely from such ores, and the same thereby rendered of values nearly equal to the absolute amounts of gold they contain, at a comparatively small expense.

change more readily possible than it would otherwise be, other things being equal. It is also certain that if the union between elements in any substance is merely a mechanical mixture, a conglomeration or solution, minute subdivision of such substance may be carried far enough to separate the elements themselves.

This process consists, essentially, in reducing the entire body of gold-bearing ore, whether free-milling or refractory, as well the gold or gold compounds therein as the gangue or other materials associated therewith, to a state of such fine pulverization that there will be no distinction between one particle and another in regard to size—*i.e.*, all the free gold will be a flour, flake or molecular condition and all the other materials will likewise be powdered, the reduction being accomplished without hammering, pounding, or compressive grinding. This reduction to practical uniformity in the minuteness of the particles of the whole mass will predispose to chemical change, and will

In the drawings, the letter A indicates an elevator or conveyer arranged to feed broken or crushed ore from any suitable rock-breaker or ore-crusher (not shown) into a hopper B, whence it falls by gravity through the inclined chute b into a pulverizing-cylinder C. The pulverizing-cylinder C may be made of any suitable material, and may be mounted and operated in any convenient manner; but the arrangement shown in the drawings and about to be described is the one preferred. As shown, this cylinder revolves on hollow trunnions which open into both of its closed ends, and these trunnions run in suitable boxes d d, secured to a supporting-frame D. The cylinder may be strengthened and further supported by rollers arranged beneath it between the trunnions. The trunnion c at the receiving end of the cylinder receives the neck of the chute b within its inner periphery at its outer end, and the joint between the two is made as close as possible in order to prevent waste. The opening in this receiving-trunnion is the frustum of a hollow cone

flaring toward the interior of the cylinder, this structure facilitating the delivery of the broken or crushed ore from the hopper into the cylinder and preventing stoppage or clogging of the ore within the trunnion.

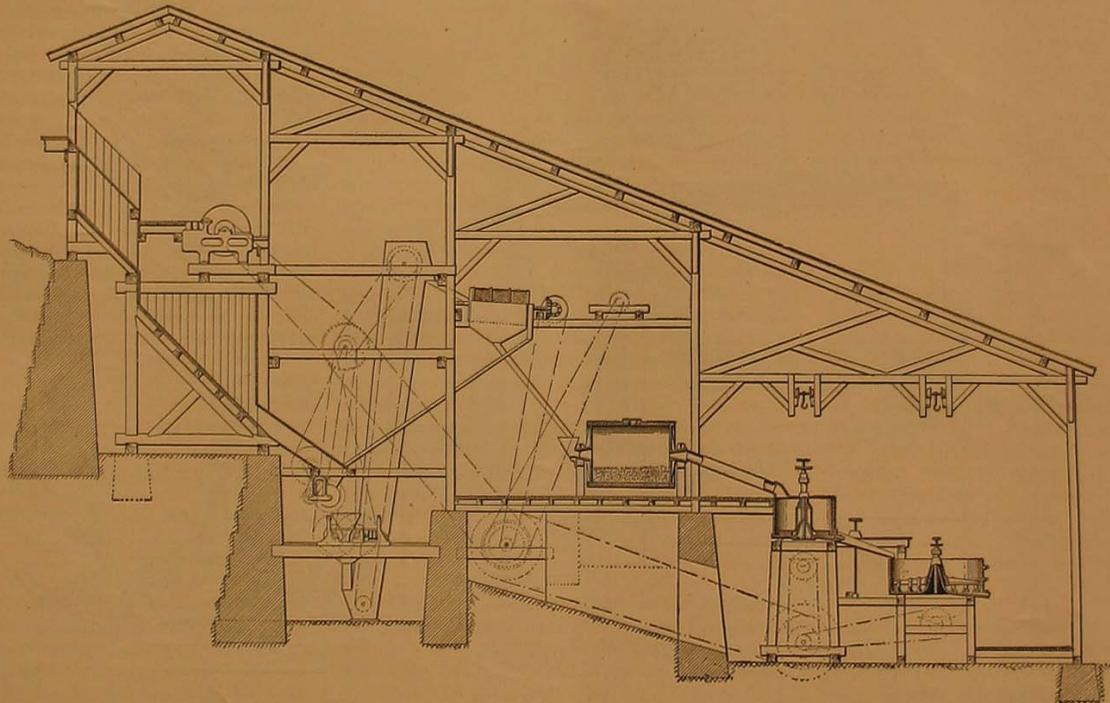
The trunnion  $c^1$  at the discharge end of the cylinder is provided with suitable guards or gratings  $c^2$  of iron or steel bars at its inner end to prevent the outflow of the pebbles, while the spaces between these bars will allow the comminuted materials to escape as soon as they rise above the middle of the cylinder. This trunnion  $c^2$  has its outer end flared, to assist in the outward feed of the pulverized ore. The cylinder is provided with a man-hole  $c^3$ , by means of which access may be had to the interior, and has at or near one of its ends the gear wheel  $C^1$  secured to it, the said wheel meshing with a gear-wheel upon a power shaft  $P$ . In practice, the best results are obtained from a porcelain-lined cylinder from eight to twelve feet in length, having a diameter of six to eight feet, and this cylinder is charged with about three tons of loose

volved at sufficient speed, would cause the crushed ore to pulverize itself without the use of flint pebbles or large pieces of ore, still experience proves that by using these pebbles, time and power are economized. The ore is fed continuously into the hopper  $B$ , and thence is fed by gravity into the pulverizing-cylinder  $C$ , where the impact and grinding action of its own particles combined with that of the pebbles and of the walls of the rapidly-revolving cylinder reduce the ore to an impalpable powder, without compression of the particles, the fineness of which, before it passes through the discharge end of the cylinder at the trunnion  $c^1$ , is determined by the number of revolutions made by the cylinder and the length thereof. It is demonstrated by actual test that under the feed or flow of the ore from the hopper  $B$ , the said feed being by gravity alone, the course of the particles of ore through the cylinder is approximately a spiral, beginning at the feed end of the cylinder and ending at the discharge end, and that by the time the ore has

into an amalgamating pan  $E$ , which, as will be seen, is of a simple and ordinary construction, but is provided with a cover  $E^1$ , having an opening for a faucet or the like, and a chute  $E^2$ , arranged at one side, which extends above the pan and embraces the outer periphery of the outer flaring end of the trunnion  $c^1$ . This arrangement of cover and chute with the flaring trunnion of the pulverizing-cylinder prevents waste of the powdered product as it falls into the pan, insures the delivery of such product within the pan, and retains it therein.

In using the amalgamating pan a flow of water is avoided and merely admits enough water to the pan to moisten the pulverized ore and form a thin paste with it. By avoiding the use of flowing water one cause of waste is eliminated, as it can easily be seen that any flow of water would carry off some of the gold in its finely-divided state.

The pan  $E$  is provided with millers  $e$ , which may be of any usual or suitable construction and material, and are driven in the



THE MURPHY PROCESS PLANT.

Norway flint pebbles, or large pieces of ore, ranging in size from one to three inches in diameter. Setting the cylinder in rotation, crushed ore is fed into it by gravity from the hopper  $B$ , and as it passes from the receiving end of the cylinder to the discharge end, the ore is ground between the porcelain lining and the pebbles and between the pebbles themselves, and the pieces of ore are gently worn away by self-attrition, the whole operation resembling as closely as possible the natural destruction and wearing away of rock, whereby placer deposits are formed. It is to be noted that the friable materials used as described, act by attrition upon the malleable constituents of the ore wearing and tearing them gently and progressively. It will be seen that no ore will be discharged through the trunnion  $c^1$  until the total mass within the cylinder rises to the level of the said trunnion and is forced outward by the flow of crushed ore through the trunnion  $c$  at the receiving end.

While it is true that the cylinder, if re-

traveled this distance it is sufficiently pulverized for the purposes of this process. It will be obvious that by lengthening the cylinder, or by increasing the rate of revolution, or by prolonging the grinding, other things being equal, the fineness of the ore will be proportionately increased at the discharge end.

Comminution may be had in the cylinder either in the presence of water or dry; but, ordinarily the use of water is found to be of advantage. However, practice in each case must determine the particular requirements of each ore-body to be ground, whether it shall be ground wet or dry, and with some ores it may be desirable to use another lining than porcelain for the cylinder.

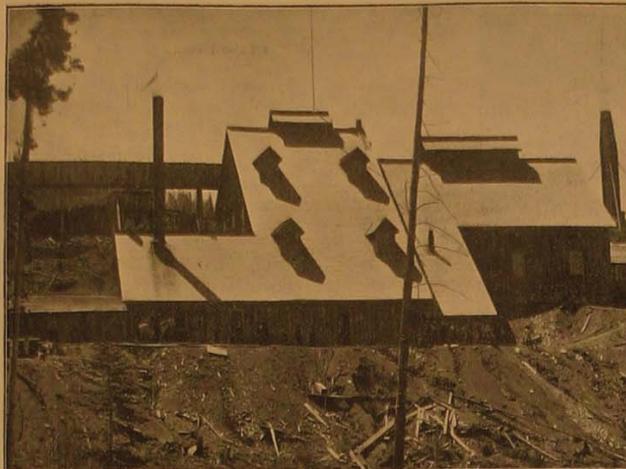
The comminuted ore may be tested to determine its fineness by taking a sample of the discharge and passing it through a screen made of silk fiber. Platinum screens may also be used as fine as two hundred wires to the linear inch, but for the finer states of comminution, silk gauze is the only means of testing. This comminuted ore is discharged

usual way by a shaft geared with the power shaft. There is an inclined well  $e^2$  in the bottom of the pan, which is provided with a plug or tap  $e^3$ , and the entire contents of the pan may be discharged therefrom from time to time by removing the tap or plug  $e^3$  and washing the charge into the settler  $F$ .

The settler  $F$  has a stirrer  $f$ , which consists of radial arms  $f^1$ , provided with shoes or plows  $f^2$ , and the whole is driven in any suitable manner, such as by the central shaft  $f^3$ , which is geared to the power-shaft  $P$ .

The amalgamation of the pulverized ore is accomplished by allowing a limited amount of water to flow into the pan  $E$ , just enough water to form a thin paste with the quantity of ore to be treated—say from one ton to a ton and a half—and then adding sufficient mercury to amalgamate the gold—say a tank of seventy-five pounds. The discharge from the cylinder may continue or may be stopped for the time being, but if the discharge is continuous there must be a continuous supply of mercury. The muller is set in rotation at

## MINING IN OREGON.



MONUMENTAL 20 STAMP MILL AT GRANITE, OREGON.

about sixty revolutions per minute, and this rate is continued until the amalgamation of the gold in the ore is completed. By panning a sample the progress of amalgamation can be easily determined. As soon as the amalgamation is complete the speed of the muller is reduced, the plug or tap  $e^3$  is removed from the orifice of the inclined well  $e^2$  at the bottom of the pan, and water is turned on to wash the whole mass of pulp and amalgam into the settler F. The water which washes the charge from the amalgamating-pan serves also to dilute the pulp and make it sufficiently fluid to enable the mercury and amalgam more readily to settle into the well of the settler, which is shown in the drawings as  $f^4$ . In this settler the amalgam and mercury are finally cleaned and separated from impurities, which are drawn off through the holes  $f^5$  in the periphery of the settler, these holes being provided of course, with plugs  $f^6$ . After sufficient cleansing by means of the revolution of the stirrer-arms and the settling of the mercury and amalgam into the well  $f^4$ , the mercury and amalgam are finally withdrawn through the said well or rather through its orifice, which is provided with a plug or similar device  $f^7$ .

It is to be understood that several amalgamating pans and several settlers or washers may be used in connection with the pulverizer, either in series or otherwise, as may be most convenient and effective, but it is considered that ordinarily with the minute and unhardened pulverization of the ore which is effected, two pans and one settler are ample in the treatment of the product, as amalgamation with pulverized and unhardened ores is rapid.

It is of importance to note that pounded or hammered gold will resist the action of mercury for a long time, and that the so-called "rusty" gold is merely gold enveloped in a coating of some substance—a gas, a film of grease, a deposit of iron rust, or the like—and thereby protected from the action of mercury. Now, before gold that has been hammered will amalgamate readily with mercury it must be annealed, and before rusty gold can be amalgamated the coating surrounding the gold must be pierced or removed. Further, the resistance of hammered gold to amalgamation with mercury is irrespective of mass, or, in other words, equal surfaces of gold hammered to equal degrees resist amalgamation equally, and the size and shape of the

hammered particles are relatively unimportant, their total surface areas being the real things for comparison. Likewise, gold which is rusty, whether in a large mass or a small particle, is protected from mercury as long as its envelope remains entire.

It has been shown that comminution is effected without condensation, hammering, or compression of the gold, and the powdered product is delivered into the amalgamating-pan not only in the finest possible condition—*i.e.*, in the condition presenting the greatest surface area for a given quantity of gold—but the surfaces of the particles making up this greatest area are worn and scratched in such manner as to present the metal most effectively to the action of the mercury, and the gold itself is in its natural and soft condition. It may be noted in this connection that some degree of heat is produced in the pulverizing cylinder, though this rarely rises above  $150^{\circ}$  Fahrenheit, and while this would not be sufficient under ordinary circumstances to cure hammered gold, it may have some effect in preparing the infinitesimal particles produced by this process for amalgamation, especially by drawing out of the pores of the gold gases, greases and the like.

Fraser & Chalmers of Chicago, Ill., are the sole agents for the Murphy Process Plants.

The colonization of the "Oregon country" is one of the marvels of the age. A little over a half century ago this great Western empire, with its peerless climate and with its varied and inexhaustible resources, was a veritable "no man's land," little known to the white men except a few trappers in the employ of a trading company. Yet it is today the seat of a high civilization and the abode of 400,000 people, possessing colleges, schools, railroads, telegraph lines, and all the institutions of the oldest States.

No reading is more fascinating to the student of human affairs than the story that recounts the details of this modern miracle.

The discovery of gold in Southern Oregon and the resulting settlement of the section was one of the many after effects of the mad rush of the Argonauts to California. To understand the cause and force of that movement, it must be borne in mind that the world's production of gold had fallen so low that the old ratio of production had changed during the previous half century from 16 to 1 to nearly three of silver to one of gold. The panic of 1837 was yet oppressive in its effect on commerce, and many hundreds of thousands of young men were, everywhere in Europe and America, ripe for any adventure.

It was not until later years that the vast resources of the State were defined. Prospecting was gradually extended further into the central and northeastern portion, until today there are very few sections that have not been more or less prospected, and good claims found and developed.

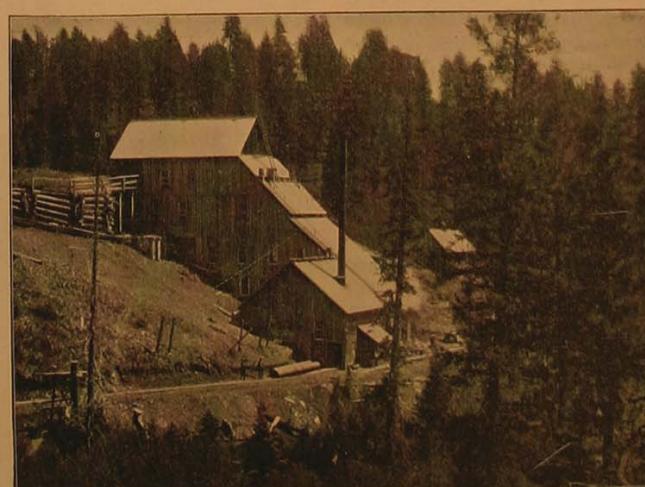
It was in the spring of 1853 that the trail between Waldo, in Josephine county, and Crescent City, in Crook county, was first constructed. This trail was built by "Bullhead" Smith, long afterwards a resident of Smith's River Corners, in Del Norte County, Cal.

A short time after the completion of this trail the traffic became so extensive as to employ nearly 3,000 mules to carry supplies.

In Baker county, near the extreme east, mining has been diligently followed and made a success both in quartz and placer properties.

Next in importance is Wallowa county, with a grand quartz belt, but practically undeveloped. Marble of the greatest variety and finest quality, in enormous quantities, has been discovered and marketed from this county.

On the other side of Baker county, south



SANGER 20 STAMP MILL, UNION COUNTY.

## GOLD MINING IN THE BLACK HILLS.

BY PROF. H. O. HOFMAN,  
Of the Dakota School of Mines, Rapid City, Dakota.

[Continued from our issues of Feb. 1st, 15th, Mar. 1st and 15th.]  
Subjects treated upon in preceding issues  
are as follows:

## I. THE ORES.

*Character of the Ores.*  
*Sorting of the Ore.*

## II. ENUMERATION OF MILLS.

## III. OUTLINE OF PLANT AND PROCESS.

## IV. GENERAL FEATURES OF THE MILLS.

*Distribution of Power.*  
*Supply of Water and Fuel.*  
*Auxiliary Arrangements.*

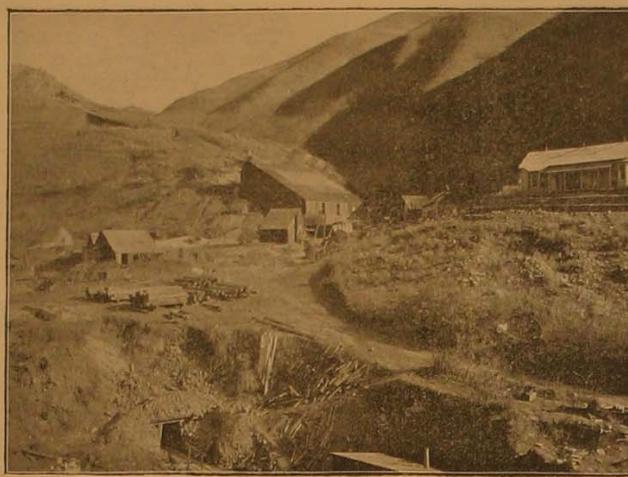
## V. THE MILLS IN DETAIL.

*Grizzlies.*  
*Rock Breakers.*  
*Ore Bins.*  
*Feeders.*  
*Battery Foundations, Frames and Guides.*  
*Battery Frames.*  
*Guides.*  
*Mortars.*  
*Dies.*  
*Screens.*  
*Stamps.*  
*Cams and Cam-Shafts.*  
*Crushing Capacity.*  
*Apron Plates.*  
*Mercury-Traps.*  
*Sluice Boxes.*

## VI. LABOR IN THE MILLS.

The man who has immediate charge of the running of the mill is the head amalgamator. He also stands directly under the foreman, and is responsible for his assistants, the amalgamators, crusher-men, oilers, feeders and day-laborers, if there are any. As, in addition to running the mill, he has charge of the collecting and safe-keeping of the amalgam, he must be thoroughly trustworthy as well as capable.

The amalgamators feed quicksilver, regulate the water supply, set tappets, renew shoes, dies, screens and chuck-blocks, and look after the running of the battery in general. Quick-silver is fed by hand every half-hour with a little wooden spoon, similar to a mustard spoon. The quantity required in twenty-four hours ranges from  $\frac{1}{4}$  to  $\frac{1}{2}$  lb. for every battery according to the character



40 STAMP MILL CONNER CREEK, BAKER COUNTY.

west, is the John Day country, full of quartz placers and coal. A still greater distance south is the Cascade mountain range of quartz; at Santiam the McKinzie river and Bohemia, from three to five thousand feet high. All these are well developed. The Santiam mines are in possession of a California syndicate and have begun a history for themselves.

From Bohemia to Canyonville, on the south Umpqua river, is a mineral blank, or nearly so. But from that point to the boundary line of California is one vast, rich hydraulic belt, that has few equals.

Douglas county, Oregon, has the richest if not the most extensive nickel mines in the world, thoroughly developed.

In Josephine county rich copper properties are being developed by Eastern parties.

The discoveries on Jackson creek were made by a man named Sykes, in December, 1851, and a little later Skinner and Pool, two packers, made like discoveries in Rich Gulch, one-half mile north of Sykes' claim. These streams were found to be marvelously rich, and for many years they produced an immense amount of gold. Within a few weeks there were over 300 men working on these creeks, and the present town of Jacksonville sprang into existence.

The Indian wars of 1853, 1855 and 1856, and other embarrassments, with which was combined the report of rich diggings on Fraser river, in British Columbia, seriously impeded the growth of the country. In the year 1858 a stampede to the new diggings occurred. This excitement was followed in 1862 by an almost as great rush to the Salmon river, riches in Idaho. These two excitements almost depleted Southern Oregon of miners, and for ten or more years the industry languished.

With the departure of the white miner came the Chinaman, who took the place vacated by the former, and during the next four years took out from the various districts many tons of gold. These Orientals never made a permanent improvement in the country, and it is now difficult to find a vestige of the thousands who once occupied the streams.

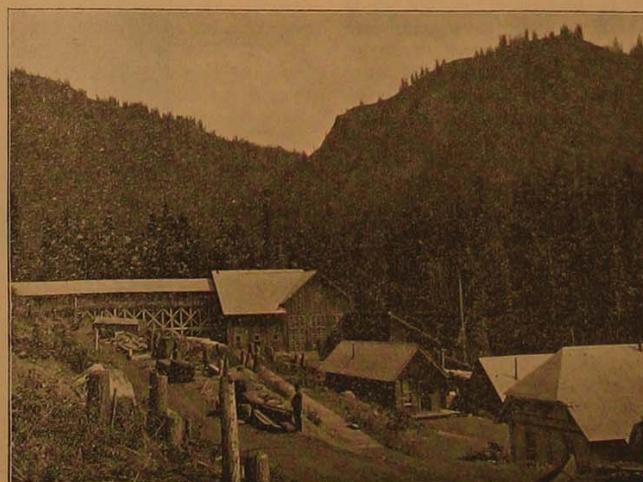
Quartz mining in Southern Oregon had its beginning in the discovery of the Hicks ledge on Jackson creek in 1859. It proved to be a pocket, but quite a snug little sum was taken out by Secora Hicks and S. R. Taylor. Gold

Hill was the next noted find in the way of quartz. It was discovered in January, 1860, by Messrs. Hays and Graham, and before it was abandoned had produced some \$200,000. Henry Klippe and others had purchased the mine within a week after its discovery, for a good round sum.

The discovery of the Gold Hill ledge quickly led to further quartz discoveries, and among others the Fowler, which yielded \$315,000; the Jewett, \$40,000; Blackwell, \$10,000; Holman, \$10,000, and Davenport, \$8000. Some of these mines are still being worked at time, notably the Jewett.

The views presented herewith show a few typical mills working on first-class ores. Space will not permit us to make any detailed mention of these mines, but it will suffice to say they are located in one vast mineral belt consisting of a stretch of mountains thirty miles in length and twenty miles in width.

In the Cornucopia district of Union county are located the Union and Companion mines. The parties who secured them a few years ago are men of means, and are sparing no money to put the property in shape. A tramway has been put in, and pipes laid and the water power of Pine creek utilized for electrical generation. A twenty-stamp mill is on the property and the mines are extensively developed.



THE OREGON GOLD MINING CO.'S. 20 STAMP MILL AT CORNUCOPIA, UNION COUNTY, OREGON

TABLE V.—*Labor and Wages.*

CLASS	Caledonia,* 60 stamps.			Homestake, 80 stamps.			Father de Smet 100 stamps.			Golden Star, 120 stamps.		
	Number employed.	Length of shift.	Wages per shift.	Number employed.	Length of shift.	Wages per shift.	Number employed.	Length of shift.	Wages per shift.	Number employed.	Length of shift.	Wages per shift.
Foreman.....	1	.....	\$6.50	2½	.....	\$6.50	1	.....	\$5.00	2½	.....	\$6.50
Millwright.....	1	12	4.50	1	10	4.25	1	10	4.25	1	10	4.25
Pipe-fitter.....				1¼		3.50				1¼		3.50
Enginmen.....	2	12	3.50	2	12	3.50	2	12	3.50	2	12	3.50
Firemen.....	2	12	3.25	2	12	3.00	2	12	3.00	2	12	3.00
Watchman.....				½	12	3.00	1	12	3.00	½	12	3.00
Head Amalgamator.....				1	10	4.00	1	12	4.00	1	10	4.00
Amalgamators.....	2	12	3.75	4	12	3.50	4	12	3.50	4	12	3.50
Crusher-men.....	1	10	3.00	5	10	3.00	6	10	3.00	6	10	3.00
Oilers.....				2	12	3.00	2	12	3.00	2	12	3.00
Feeders.....	2	12	3.25	2	12	3.00	4	12	3.00	4	12	3.00
Day Laborers.....	1	10	2.50				1	10	2.50			
Total number.....	12			20½			25			23½		

\*With the 20 additional stamps the Caledonia mill requires only one extra man, a car-ran, at \$2.50 per shift, to transport the ore. A chute from the main ore bin to the bin of the new stamps, has not enough fall for the ore to be discharged automatically.

of the ore, which varies a good deal. The correct amount is found out by the "feel" of the amalgam collected on the apron-plates. If this be hard and crumbly, there is danger of amalgam being carried off by the pulp, and more quicksilver is added. On the other hand, if too much quicksilver is fed into the mortar, the plates become too soft and slippery, less amalgam collects on the inner plates, and there is danger of liquid amalgam rolling off the apron-plates. Two methods of adding quicksilver are in use. At the Homestake mills, all the quicksilver required is added in the mortar, and the amalgam obtained is of medium hardness. At the Caledonia mill it is the aim by adding only part of the quicksilver in the mortar, to make the amalgam on the inside plates as hard as may be, and to add the rest to the apron-plates, keeping these somewhat softer than those of the Homestake mills. Each management is satisfied with its own way of feeding the quicksilver, and it would be difficult to decide in favor of either method. Perhaps the fact that the Caledonia ore has, on the whole, coarser gold than the Homestake ore, may explain this difference in feeding.

The entire loss in quicksilver incurred by the Homestake management per year per stamp is 5.27 pounds, or, according to the tons of ore milled by the Homestake and Golden Star mills, 0.0044 pounds per ton of rock crushed. The entire loss incurred by the Caledonia mill is 7 pounds per year per stamp, or 0.0011 pounds per ton of rock crushed. Of course, with the hard and strongly mineralized rock the Caledonia mill has to crush, more quicksilver will be flourished per stamp than with the Homestake rock; and on account of the smaller quantity of rock crushed per stamp, less quicksilver is consumed per ton.

The amount of water required will vary according to the specific gravity of the rock, the percentage of sulphurates and the incline of the apron-plates. An excess of water will make the pulp in the mortar too thin (thus preventing an intimate contact of gold and quicksilver), will assist coarse crushing and will hinder the settling of amalgam on the apron-plates. Too little water will assist amalgamation, but will hinder the pulp from passing the screens and will not carry that which has passed through them. As a rule it is better to use too little water than an excess. The right amount will just carry the pulp evenly over the apron-plates. The

Homestake mills use in twenty-four hours 1 inch of water per battery, the Caledonia mill 1¼ inches.

The setting of tappets is necessary that the stamps may always have the same height of drop, whether the shoes and dies are new or somewhat worn down. To accomplish this, the stamps are hung up, the mortar opened, the stamps then lifted up by means of an iron bar, used as a lever, and a block of wood, 1 inch higher than the desired drop, placed between shoe and die. The tappet is then loosened, allowed to fall on the prop and again keyed fast. As the prop and the block of wood, placed between shoe and die, are both 1 inch higher than the required drop, on removing the blocks the stamps will all have the desired uniform height of the drop, while the different levels at which the tappets are keyed to the stem, will indicate how much the shoe and die are worn down.

The crusher-men, in addition to looking after the grizzlies, breaking the coarse rock and feeding the crushers, have to watch for any pieces of wood and iron found amongst the ore, take it out and throw it aside. This is the only way in which the amount of chips of wood entering the mortar can be reduced to a minimum. All small pieces of wood that pass through the grizzlies are finally found in the mortar, where they are periodically removed by the amalgamators, if not previously taken out by the ore-feeders, when the ore passes from through of the automatic feeder into the mortar.

The oilers have to keep all wearing iron parts of the mill lubricated, and have to be especially careful not to use any excess of grease at parts where it might drop into the mortar or upon the apron-plates.

The feeders attend exclusively to the regular and uniform feeding of the ore. The principle followed is to feed the ore "low". The height of ore between shoe and die should never be more than 1 inch and as much less as is possible without the stamp beginning to pound, or, as a Mr. Adams expresses it, "let iron almost wear on iron".

One or two day-laborers are generally found around a large mill, because their apt to be constant need of extra work which does not fall within the province of the regular hands.

The shifts in the mills are changed monthly. Table V. shows the amount and kind of labor in mills of 60, 80, 100 and 120 stamps.

From the foregoing table it will be seen that the Caledonia mill employs fewer men

than any of the other three mills. In comparing the 80 and 120 stamp mills of the Homestake Company, located next to each other and working on the same ore, we see that only three more men are required in the latter than in the former, although the product is half as much again. From this it can be seen that a large number of stamps is very profitable, as greatly increasing production without necessitating commensurate outlay of labor.

*Daily Collecting of Amalgam and Dressing of Plates.*—The amalgam which has collected on the apron-plates during the previous twenty-four hours is removed every morning when the day-shift begins. At the Homestake mills the head amalgamator, at the Caledonia the day-amalgamator, each with an assistant, has charge of the operation. Every amalgamator has his own way of managing the details in this work, although the general outline is always the same. The method of the Golden Star mill will serve for illustration.

When the plates are to be cleaned, the water-supply of the one battery is shut off, the stamps are hung up and the splash-board removed and washed at the head of the apron-plate with water through a hose. It is then placed at the lower end of the plate and the hose is turned on to the screen and apron to remove all the sands that have collected there. The plate, if normal, is now clear and bright, except for occasional spots, so-called blisters, resulting from iron and copper salts. These are removed with a scrapper (a blunt, double-edged chisel). Then the two men loosen the amalgam with heavy whisk-brushes, beginning at the top and working downward. When this is done the amalgam is swept in the opposite direction and collected at the head of the apron. There it is brushed into the amalgam-scoop with a rubber scaper (a small, sharp-edged piece of belting) and emptied into a small iron receiver. After this the plates are brightened by brushing them with a wisk broom, using tailings moistened with a dilute solution of potassium cyanide, the men working from the head of the plate downward. If necessary a little quicksilver is sprinkled on the plate from a bottle over the neck of which a piece of canvas is securely tied. After being brightened, the plates are smoothed with soft paint brushes passed transversely over them, beginning at the bottom. This finishes the operation, which requires four hours for the twenty-four plates.

The amalgam contained is contaminated with impurities. To remove these it is placed in a Wedgwood mortar and diluted with quicksilver. The amalgamator then adds water and works the amalgam to bring all impurities to the surface. These are in part washed off (the sands) with a hose, in part removed with a sponge or wet cloth (the base-metal amalgam) until the amalgam is perfectly bright. It is then passed through a small strainer and the residual pasty amalgam is transferred to a piece of linen, where the excess of quicksilver is pressed out by wringing. The ball of hard amalgam obtained is locked up in a safe and kept until the next clean-up. All the sands are returned to the battery; the waters go to waste, and the quicksilver goes back to the main stock.

*The Clean-Up.*—Twice a month the gold amalgam adhering to the inner plates is removed, when the necessary repairs in the mill are also made. At the Caledonia mill the operations are the same at the first and fifteenth of the month and similar to those of the first of the month at the Homestake mills. At the latter the clean up in the middle of the month

differs from that at the beginning. At the first of the month the entire mortar is emptied, and shoes and dies are changed, if necessary, while on the fifteenth it is intended to remove only the amalgam from the inside plates, and to clean up the mercury-traps.

At the Golden Star mill the clean-up at the first of the month is carried on in the following way: It begins at seven in the morning. The feeding of the battery is stopped a quarter of an hour beforehand. The stamps are made to drop slowly, so that at seven o'clock no more ore may be found in the mortar above the screen-frame. The splash-boards are removed, the stamps are hung up, the water is shut off and the engine is stopped. The mortars on one side of the mill are then opened by removing the curtains, screens and chuck-blocks. The curtains and screens are first roughly washed by playing a hose over them. They are put aside to be more carefully cleaned later on. The six chuck-blocks from the batteries facing that side of the mill which is being cleaned up are placed on two apron-plates, at each of which are four men to remove the amalgam under the supervision of the head amalgamator. This is done by scraping the plates with a chisel, when the hard amalgam drops off on the apron plate beneath. As much amalgam is removed as is possible without exposing the copper. Then quicksilver is sprinkled on the plates, to dilute the hard amalgam somewhat. This is then divided evenly over the plate and brightened by scouring with a whisk-broom and tailings, and finally smoothed with a soft paint brush. The amalgam that has dropped on the apron-plate from the three chuck-blocks is collected at the head and put under lock and key by the head amalgamator. Thus the chuck-blocks of the entire mill are scraped and cleaned in four sets of six each. In the meantime another set of men wash and scrape the rim and flanges of the mortar and collect the amalgam. They also remove the plate amalgam which has settled during the past twenty-four hours. This is then also taken in charge by the head amalgamator. The dressing of the plates does not take place as yet. In order to keep them soft, a little quicksilver is sprinkled over them and evenly distributed with the brush. A third set of men begin with the work on the mortar as soon as the amalgam from the apron-plate has been removed. Two small platforms are placed at its head on the wooden frame for the men to stand on. They then remove the water still remaining in the mortar, and shovel out the sands above the dies into a heap on the apron plate. (As the sands consist simply of coarse ore and do not contain any amalgam, they are returned to the battery after the dies have been put again in place). Before the die can be taken out the stamp has to be raised higher. Formerly block and tackle were used for this purpose. Now a piece of timber is placed crosswise on the rests of the splash-board, serving as a fulcrum for an iron bar with which the stamp is raised. It is kept in this position by placing a 4-inch piece of wood on the prop of the stamp and allowing the tappet to rest on it. The dies are pried up with the iron bar, lifted out and roughly cleaned. Those which are to be exchanged are taken away and piled up to be carefully scraped and washed in due time. Those that are still good (dies last six weeks) are returned to the mortar without further cleaning. After the dies have been taken out the remaining sand is shoveled out and piled up in a convenient place in the mill to be treated separately in the rocker and the

pan (see later). It is rich in amalgam and contains pieces of iron that have accumulated in the mortar. Any particles of amalgam that have adhered to the rough sides of the mortar are removed and added to the sands. The dies are now put in place again. If new shoes are required they are placed on top of the dies, with the wooden collar slipped over the shank. Then the recesses for the chuck-block, screen-frame, etc., are cleaned by directing a hose upon them, and these are put in place, the screens having first been cleaned in a wooden box with brush and water. When the chuck-block is in place, the sands first removed are shoveled in to fill the bottom of the mortar up to the top of the dies. The top of the stamp has now to be regulated. If new shoes are used, the wooden block, one inch higher than the drop, is placed on the shoulder of the shoe and the stamp let down until the head rests on the block. If the shoe has not been replaced, the block stands upon the die. In both cases the keys of the tappets are loosened; these are allowed to fall on to the prop, and are then keyed up again. The apron-plates are now dressed in the usual way. Any amalgam adhering to the small sluices leading to the mercury-traps and to the sluice boxes is removed, and these are brightened in the same manner as the apron-plate. When the engine has been started up, the stamps that have new shoes are first allowed to drop several times until the sound and the vibration, felt when touching the tappet, show that the shoe is thoroughly fastened to the head. The splash-boards are put back in place, some ore is fed into the mortar, the water is turned on, and the stamps of one battery after another are let down from the props. Special care has to be taken by the feeders to regulate the ore supply, as the mortars are empty above the dies when the mill starts up.

In cleaning up a mill all the hands have to take part, the night shift working six hours extra.

This detailed description of the clean-up of a 120-stamp mill has been given because it seems important to show how it is possible to accomplish it in the short space of seven hours without requiring any outside help. When it is remembered that more than a day was formerly consumed in this work, it will be seen how admirably the operations are now systematized and worked one into another.

(TO BE CONTINUED.)

## CORRESPONDENCE

### CALIFORNIA.

#### Tuolumne Mines.

Drifting on the low level tunnel progresses at the Rock Ribbon Mine. Everything is looking well.

Mr. Thomas formerly superintendent of the Dead Horse Mine has taken charge of the Seminole Mine and will start at once to unwater the shaft.

At the Lady Washington Mine the mill is still running. They expect to open the lower level tunnel which will give 1100 feet of backs to the apex. The vein averages four feet between the walls.

The Providence mining Company are still working on their road. They have commenced to grade for a forty-stamp mill. The shaft is down between 200 and 300 feet and the vein averages seven feet.

Grading for the new 20-stamp mill is being carried on at the Alameda Mine. Fraser &

Chalmers of Chicago have a contract for building the mill, which is expected will be completed inside of a month.

At the Dead Horse Mine sinking is being pushed to the 1550 foot level, where a station will be opened and drifting commenced. Mr. Davis is the superintendent. They have a rich shoot of ore with a four foot vein.

The shaft at the Grizzly Mine near Summersville is now down 350 feet and a station is being put in. A bridge is also being built across the Tuolumne River. The site for the new mill is being graded on the south side of the river and on the north side they are grading for the concentrators. Water is the power used with 300 feet of fall. The hoist is operated by a turbine wheel. Thirty men are employed.

ARGUS.

## MEXICO.

TOPIA, DURANGO, MEX.,  
April 10, 1898.

EDITOR JOURNAL: The Madrugada mines are still going ahead as usual, the monthly output being about 30,000 ounces, of which 10,000 is exported to the Everett smelter, Washington, through their agent in Culiacan.

The projected narrow-gauge railway from here to Culiacan is being rapidly pushed, already being in the hands of energetic and enterprising men, Messrs. Miller and Sibley Franklin, and there is no doubt of its being completed in a very short time. Mr. E. C. Reed is chief engineer, enough to guarantee us a good road.

The Madrugada mines will soon have the compressed air to run their drills. The compressor is now completed at their mill in Molinos. Power is obtained through a 14 inch pipe with a fall of 700 feet. This gives power to run, besides the compressors, their mill, having a capacity of putting through 20 tons in 24 hours.

The Canta Ranes mines are still in litigation over the debt of \$300,000. The property is well worth it; with good administration it could be made to pay off the amount in less than five years. They have a 15-stamp mill, and enough ore in the mines to keep them going, with an average value of 75 ounces per ton. The process is lixiviation, having tailings of 7 ounces. I am sure that \$30,000 gold would buy the property, and it could be started up immediately. Ore from those mines has always been shipped to Culiacan, and it is well known that it goes 250 ounces and 40 per cent lead to the ton.

Fifteen miles from Topia, situated in a broad valley with plenty of water, lies the beautiful town of Canelas, noted for its tropical fruits and beautiful gardens, where for \$200 one can take his choice of them. Orange trees 20 years old and giving \$15 to the tree can be had for a song. The writer has seen coffee trees giving four pounds to the tree. Even with this result there are not 100 trees in bearing. Work is not easy for these people, who have been accustomed to live off the product of their orchards for centuries. Silver, gold and copper mines combined are numerous, but for lack of capital they are not opened. All those that are being worked are giving their owners good returns. Five thousand dollars was refused for a mine a week ago, that had had two days' work done on it. Assays made by Mr. Edwards gave 3 ounces gold, 700 ounces silver and 20 per cent copper.

J. M. E.

## Miscellaneous Mining News.

## ALASKA.

## Klondike Hydraulicking.

A plant worth nearly \$250,000 has been ordered for the working of the hydraulic gold gravels on Hunker creek, recently located by Mr. Robert Anderson. This is the property in which Messrs. Rand & Carroll of Vancouver are interested. Wealthy English capitalists have taken up the property to the immediate considerable benefit of Mr. Anderson and his associates, and it is hoped to the ultimate large profit of all concerned. The greatest interest naturally attaches to this, which will be the pioneer hydraulicizing effort in a country of exceptional difficulty for such work. Indeed, success is only rendered likely by the quite exceptional richness that is reported of the Hunker creek gravels.

## ARIZONA.

The Williams, Ariz., smelter will be completed about May 15th. It will have a capacity of about 80 tons.

W. B. Gerard will start his mill in Lost Gulch, near Globe, next week for a test run of 200 tons of ore. Mr. Gerard is negotiating for the sale of his mines, which are regarded as good property.

Seven men are pushing work on the main tunnel of the London and Gallon mines, in Pima Co., which is now in 120 feet. It is expected 90 feet more will reach the ledge for which they are driving. A depth of nearly 300 feet will have been attained on the ledge when that ore body is reached, and should it maintain the same uniformity of width and value as is shown on the surface, the property would be ranked among the big copper producers of the territory.

## CALIFORNIA.

## AMADOR COUNTY.

The Pocahontas people of Drytown are feeling good over the three-foot ledge of gold-bearing ore they struck on a west-crosscut at the 400-foot level, about seventy feet from the shaft. They are now drifting south on the ore body. This is the ledge that was struck in the adit crosscut at about seventy-five feet in depth, and is probably the west vein of the Mother Lode. It was encountered within seventy-five feet of where the best mining engineers said it would be, judging from where it was known to exist, three miles in one direction and between one and two miles in the other from the Pocahontas.—*Amador Ledger*.

## EL DORADO COUNTY.

There is considerable activity in mining operations on the North Side. At the Gopher-

Boulder there is a full force working. Development work is in progress and the mill is running to its fullest capacity on ore from the Gopher which shows up well.

The new stamp mill on the Hughes mine, near Fairplay, is in course of construction, and the mine is considered to be one of the best in the district.

The Uncle Sam mine is in good working rock now, and fine headway is being made, with a prospect of soon being in the channel.

## INYO COUNTY.

It is reported that an exceptionally rich strike of copper has just been made on the property of the Inyo Mining Company, 144 miles north of Inyo. The strike was made on the 700-foot level. Besides the copper, gold, silver and lead ores are now being taken from this property in paying quantities. It is also reported that a smelter is now being put in which will add materially to the output as heretofore all the ore was shipped either to Denver or San Francisco to be smelted. Owing to the recent copper finds additional mechanism for smelting that ore will be put in, and within three weeks the smelter will be in operation.

## KERN COUNTY.

At the annual meeting of the Little Butte Mining Company in Los Angeles on the 5th ult., the company was completely re-organized and some very important changes were made. Mr. E. Lee Allen has sold his entire interest to Dr. P. E. Doolittle, of Toronto, who became vice president and a director.

The officers of the company now are as follows: H. C. Oakley, president; Dr. P. E. Doolittle, vice president; W. J. Clark, secretary and general manager; the remaining directors are B. N. Clark, Warren Gillelen, I. C. Wood and J. W. Oakley.

## PLACER COUNTY.

At the Herman Mine, Newcastle, the main tunnel extends 300 feet to the ledge, thence following the ore body 350 feet, a continuous pay chute averaging 6 feet in width. At least six months' run for the 10 stamp mill remains in the stopes on this level. About 1000 tons are mined in the stopes ready for milling. The company contemplates the erection of a 30-stamp mill to be run by electric power. The generator will be placed on the American River, one mile from the mine. Thirty-two men are employed. The mill runs steadily and crushes 25 tons of ore per day.

## RIVERSIDE COUNTY.

Up in Crown Valley in the hills south of T. S. Brown's place a pile of rocks attracted R. S. Thomas' attention a few weeks ago, being entirely different from other rocks of the immediate vicinity. The pile, although standing on the surface, is extraordinarily rich in gold. A shaft has been sunk about twenty feet, cross-cutting done in every direction, but no trace of the ledge has been found.

## SAN BERNARDINO COUNTY.

A rich strike has been made on the desert in San Bernardino County, by F. J. Dehm of San Diego and A. H. Luscomb of Bernardo. Mr. Dehm returned home last week from a six weeks' prospecting trip at Twenty-nine Palms in San Bernardino County and brought along samples of ore from one of the mines located. The samples assayed \$1220 per ton. Mr. Luscomb is working on a claim at present, and Mr. Dehm will return in the fall to assist in developing the property.

## SAN DIEGO COUNTY.

The two-stamp mill at the Senator mine in San Diego County, and 18 miles northwest of Yuma, has been running day and night since it first started a few weeks ago, and is crushing on an average of seventy tons a day. The ore is being mined on the 100-foot level and averages about \$10 to the ton. Development work is being carried on at a depth of 200 feet, and the ore body increases in width and value with each foot of depth acquired.

## SHASTA COUNTY.

Wolfe & Wheeler are developing a property in Summit Gulch. The ledge is in a contact of slate and diorite, varying from 3 inches to 2 feet. About 50 tons of ore is on the dump, which is estimated to carry \$60 per ton in free gold, besides a good percentage of rich sulphurites.

## SIERRA COUNTY.

The Sierra Buttes Mine at Sierra City is working twenty men, and it is said will increase the force in a short time.

The Cleveland is running steadily and employing twelve men.

## SISKIYOU COUNTY.

The Vesey Bar Co., below Honolulu, Klamath River, has commenced hoisting pay gravel this week, and expect to realize good returns this season.

The Benz Bar Co., at Honolulu, Klamath River, having worked out their old cut from last year, is now constructing a big wing dam covering a large extent of the channel, expected to prove as rich as the section worked last year and early this spring.

## COLORADO.

## Almost Half Gold.

A new strike in the Village Belle on Spencer mountain, in Gunnison county was made during the past few days. A ten-pound pail full of ore was taken from a streak an inch in thickness. The ore was nearly one-half gold. In addition to the rich ore the mine has a three-foot vein of tellurium ore that is said to be very rich. Five tons of ore was hoisted from the mine April 15th, and the output will be increased as rapidly as new ground can be opened up.—*Colorado Springs Mining Investor*,

## '76 Company Dividend.

The directors of the '76 Gold Mining Company met April 15th and declared a dividend of two cents per share on the capital stock. It was distributed April 20th, the books closing on the 15th and reopening on the 21st of the same month.

The '76 company is a Colorado Springs corporation, promoted by W. P. Bonbright & Co. It owns the First Centennial mine at Black Hawk, Gilpin county, a property with a big record.

## IDAHO.

Pete Young came down from Boyle mountain last week. He reports having struck a prospect on the surface of the Hannah Belle just a few days before he left, and after running in about ten feet, he developed a six-inch body of high grade ore and the width of the vein still increasing. Mr. Young located the Hannah Belle last spring and has been working it during the past winter in company with J. E. Coburn, who leased a half interest.

## MICHIGAN.

No. 1 shaft in the Arnold is now down 900 feet. A new hoist has been ordered, with a battery of steam boilers and an air compressor with a capacity of 25 drills. The railroad to connect the mine with the Copper Falls stamp mill has been surveyed, and the rails ordered. Construction will begin as soon as the frost is out of the ground. The road can probably be completed in two months.

## MINNESOTA.

The property of the Sellers Ore Company, the Sellers mine at Hibbing, is being sold to the Lake Superior Consolidated at a comparatively low price. The mine is an excellent one, but can be wrought by the Consolidated company to better advantage, for many reasons, than by any one else. It adjoins a Consolidated property, and is part of the same ore body, while the rates of freight the Consolidated charged the Sellers company militated against free operation of the mine, so much so, in fact, that it was closed down all last season. The mine belonged chiefly to Shoenerger, Spear & Co., Pittsburg, and contains an excellent ore.

## MISSOURI.

With a capital stock of \$10,000, W. F. Hackney, W. B. C. Brown of Kansas City, Henry F. Hoyt of St. Paul, G. W. Hackney and O. H. Gray of Springfield, have incorporated the Hermit Mining Company of Joplin, to develop lead and zinc mines at Hell's Neck.

The John Jackson Mining Company made 52 tons of zinc ore last week in four 9-hour shifts. A large compressor to run air drills has been put in. Double shifts will be run, and the turn-in will be over 100 tons of zinc ore weekly.

## MONTANA.

The work of sinking below the 1,600 level at the Green Mountain still continues.

The Anaconda will be pushed to a lower depth as soon as the new engine is in place.

Prospecting and development work is still in progress on the Moonlight and Washoe properties.

A cross cut from an old drift on the 400 level on the Colusa-Parrot encountered the richest strike ever made in that mine. The vein is about 15 feet wide and is almost pure copper glance.

The Boston and Montana and the Boston and Butte companies of Butte announced to their employes last week that in the future there would be no Sunday shift in their mining properties. It is expected that the Sunday holiday feature will soon become general in Butte.—*Western Mining World*.

## NEVADA.

Jack Thompson and Jim Noble, who have been visiting the mines owned by them and W. S. Collins, of Riverside, returned recently from the mines, and they come back better satisfied than ever that they have got the biggest kind of a bonanza in the mine.

The mines are located about twenty-five miles from Manvel in San Bernardino county, but are in Nevada State. In describing the mine to the *Riverside Enterprise*, Mr. Noble said that their ledge is fully eight feet thick

at the present time, and that it is widening as the shafts go down. The ledge can be traced without difficulty for a distance of 3000 feet, and rock taken from the ledge anywhere shows good prospects.

## NEW MEXICO.

### A Rich Strike.

An important and rich strike was made on the Moreno lode, one of the Red Bandana group, last week. A two-foot lead of \$200 ore was uncovered by a cross cut in the old shaft. This lode, the Moreno, was known to be one of the richest of the group, but had not been worked in recent years on account of the great amount of development work on other leads which furnished all the ore needed for milling. The ore in the Moreno is of uniform character. Pieces taken at random from the dump show large quantities of free gold.

## OREGON.

A party of San Francisco capitalists are on Evans creek, Josephine county, this week examining the Howell & Borden placer proposition on Saxe's creek. This enterprise contemplates the construction of a 13-mile ditch carrying the waters of Evans creek on to several hundred acres of rich gravel land on Saxe's creek, and later it is proposed to extend the ditch on to the Rogue river valley.—*Oregon Mining Journal*.

## SOUTH DAKOTA.

The miners are breaking down about six tons of ore a day in the Harrison mine. The ore shoot has increased in size to 4 feet thick and 12 feet wide.

Work has again started in the Hercules shaft in Two Bit after a shut-down for several weeks for new machinery and a steam pump. The shaft is down 110 feet and is sunk by power drills.

## UTAH.

Dividends declared and paid during the week ending April 15th amounted to \$121,000, an excellent showing indeed and one that should inspire confidence in the mines of the State.

Silver King has paid its usual dividend. On April 30th Sacramento will have paid its regular dividend. Swansea paid its April dividend on the 10th, and on April 13th the South Swansea declared its regular payment.

The regular quarterly dividend of 5 cent per share has been declared by the Alice. At the properties a very fine showing continues to be made.

Bullion-Beck resumed dividend payments on the 13th, paying 10 cents per share on that date. Payments are expected to be regular in the future.

## WASHINGTON.

One of the most important deals made in the Republic camp, Stevens county, was that consummated early in the week whereby the Ben Tillman group of claims passed into the hands of a Canadian syndicate, the members of whom are largely interested in the War Eagle Cons. Mining Company. The price is given at \$50,000. The group consists of the Ben Tillman fractional claim. The new owners will arrange for immediate work.

## FOREIGN MINING NEWS

### BRITISH COLUMBIA.

#### A New Smelter.

The Van Anda Copper and Gold Company will immediately erect a smelter on the coast of British Columbia. The plant occupies four cars, weighs 90 tons, has a capacity of more than 50 tons per day, and is en route from New York by Great Northern to Seattle, Wash., and by boat from there to Van Anda City, Texada Island, B. C., which is in the midst of the company's ten properties. These properties are now sufficiently developed to supply 50 tons per day of \$30 ore, which will give the company a net profit per ton of at least \$20. Repeated shipments of the ore during the past two years to various smelters have proven this value in the ore.

After September 1st the company will make daily shipments of matte carrying about 50 per cent. copper, 3 ounces gold and 50 ounces silver per ton.

## MEXICO.

The Nogales *Oasis* says it is currently reported that the long-pending deal of the sale of the Creston-Colarada mines at Minas Prietas, Sonora, Mexico, has at last been consummated. The purchasers are said to be the same parties who purchased the Grand Central and Amarillas mines at the same place about two years ago. If that is the case, then the London Rothschilds have secured another big mining property in Sonora, as they are the principal stockholders in the Grand Central properties.

## PERSONAL NEWS ITEMS

JAMES H. WEDDLE, manager of the Arkansas Valley Smelter at Leadville, Colo., has returned from an extended trip to New York, Chicago and Kansas City.

M. P. BOSS of San Francisco is at Vera Cruz, Mexico.

T. W. JAYCOX, mining engineer of Leadville, Colo., has returned from a month's stay in New York city.

G. W. STARR has been appointed Gen. Mgr. Empire mine; Grass Valley, Cal.

FREEMAN SCHINCK of Salt Lake City has been looking over gold properties about Grant's Pass, Oregon.

B. MASON of the Newton M. Co., Placerville, Cal., has returned home from San Francisco, Cal.

WINTHROP W. FISK, mining engineer of Boston, is about to go to Alaska in the interests of the Mount Wrangell Company.

The Sunn. Shorty Hope mine at Jacksonville,

Francisco, Cal.

P. J. DONOHUE, mining and metallurgical engineer, of Salt Lake City, is on his way to Mexico to assume the management of mining and reduction works in that country.

## THE MARKETS.

NEW YORK, Apr. 27th, 1898  
The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER.	COPPER.	LEAD.
April 18	56½	11.25	3.50
" 14	56	11.50	3.55
" 15	56½	11.62½	3.55
" 16	55½	11.75	3.60
" 18	55½	11.75	3.50
" 19	55½	11.60	3.50
" 20	56	11.62½	3.50
" 21	56	11.70	3.50
" 22	56½	11.70	3.50
" 23	56½	11.65	3.50
" 25	56½	11.70	3.50
" 26	56	11.75	3.55
" 27	56½	11.75	3.50
" —	—	—	—

It is hardly worth changing quotations in silver market as the prices remain about the same. There are very few sellers in the market, and those only with small quantities.

The demand is also very unsteady.

The United States Assay Office in New York reports the total receipts of silver at 196,000 oz. for the two weeks ending April 23d.

## COPPER.

While the tendency remains very strong and no cheap copper is obtainable very little business has been done, on account of the political uncertainty hanging over the country. Such business as has been done was at full figures, but naturally buyers are rather hesitant in times like the present. Lake copper remains as scarce as previously reported; there does not appear to be any sellers at 12c. Electrolytic copper is quoted 11½c. for cakes, wirebars or ingots, 11½c. for cathodes, 11½c. Casting copper is nominal at 11½c.

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LEAD.  
Lead has been very dull, and not much progress has been made in any direction. Buyers hope to do better by waiting somewhat, while producers look for rather higher prices and are holding firm. The price in New York has still to be quoted \$3.60.

## SPELTER

Selter continues in excellent demand, and most producers are sold out for future delivery. Business has been done at \$4.25@\$4.30c., New York, and \$4.07½ @ \$4.10., St. Louis.

## ANTIMONY.

No change of any note has occurred. Quotations for Cookson's 8½c., Hallett's 7½c.; Japanese 7½c. and U. S. Star 7½c.

## NICKEL.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33½c. and 36c per lb and for smaller orders 35½c. and 38c.

## TIN

The markets have been dull and business rather restricted. Still, quotations remain steady, and we quote 14½c. per spot, and \$14.45 for futures.

## PLATINUM.

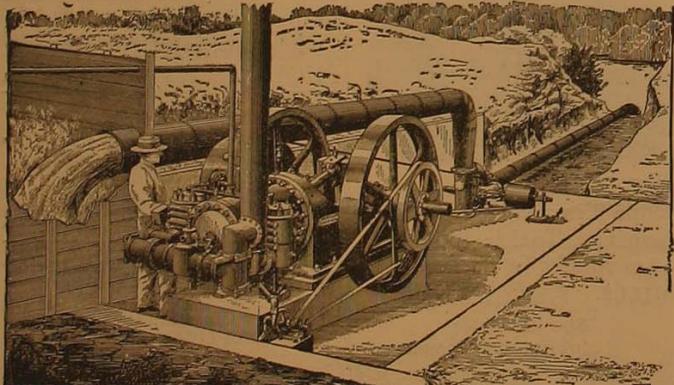
Prices are now quoted at \$15 and \$16 per oz., New York. The London quotations are 58 @ 60s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal, Messrs. Eimer & Amend of New York furnish the following quotations: In lots of 250 grams or more, 56c. per gram; in lots of 100 grams or more, 57c. per gram; less than 100 grams, 58c. per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

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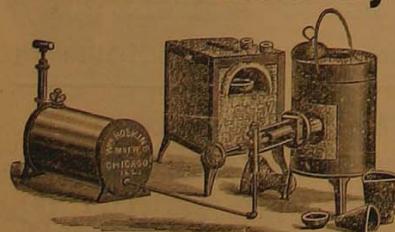
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The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works in the Packer Ranch, Colusa Co. 80 h. p. Hercules Engine, pumping 7200 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas, Gasoline and Oil Engines, 2 to 200 h. p. Send for Catalogue. HERCULES GAS ENGINE WORKS, 216 Bay St., San Francisco.

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CHICAGO, ILL.

## QUICKSILVER.

The New York quotation areat \$39.50 per flask.

The Bureau of Statistics reports the exports of quicksilver from the United States in February, 1898, at 61,973 lbs., against 65,495 lbs. in 1897.

## POWDER.

The market at San Francisco is fine with the current quotations.

The quotations are as follows:

For Hercules No. 1, from 11½c. to 17½c., according to strength and quantity. No. 2, from 9c. to 11c., according to strength and quantity.

## COKE.

The market at San Francisco, Cal., is quoted as follows:

English, spot, in bulk.....\$11.00  
" " in sacks.....12.00

Cumberland.....10.00

## BORAX.

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:

Refined, in carload lots, in barrels.....7½  
Refined, in carload lots in sacks.....7  
Powdered, in car lots.....7½  
Concentrated, in car lots.....6½

## THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:  
No. 1, 98 per cent. ingots, per lb.....34@40c  
No. 2, 90 " " " " .....31@34c

Rolled sheets, per lb.....38c up

Aluminum-Nickel, per lb.....33@39c

Bismuth, per lb.....\$1.30@1.50c

Phosphorus, per lb.....40@50c

Tungsten, per lb.....70c

Ferro-tungsten, 60 per cent.....60c

Variations in price depend chiefly on the size of the order.

## CHEMICALS.

Few orders are being booked, though deliveries on standing contracts have been large this week.

Quotations generally are as follows:

## CAUSTIC SODA.

Quotations for Caustic soda domestic high test are \$1.50 @ 1.55 per hundred lbs.

## ALKALI.

Domestic, 58 percent., 45c. @ 50c., foreign 45c. @ 50c. from dock as to style of package.

## CARBONATED SODA ASH.

58 per cent., 90c and 95c per 100 lbs. basis 48 per cent.

## BI-CARBONATE OF SODA.

English, \$1.75 and \$2.12½ per 100 lb. American, bulk, \$1.25 and \$1.50 per 100 lbs. according to brand.

## SAL-SODA.

For domestic, 50c. per 100 lb., less usual discounts; English, 62½c. and 65c Concentrated sal-soda, \$1.35 and \$1.60 per 100 lbs.

## CHLORATE OF POTASH.

Chlorate of potash is quoted at \$8.35 and \$8.50 per 100 lbs.

## Acids.

The market for the following acids lacks interest; has practically been at a standstill, through prices are pretty steady and hold up well.

Prices are per 100 lbs. in New York and vicinity in lots of 50 carboys or over. Quotations are as follows: Acetic acid, commercial No. 8 \$1.40 @ \$1.55; redistilled, 28 per cent., \$2.00 @ \$2.15; Muratic acid, 18 per cent., 1.00 @ \$1.37½; 20° \$1.10 @ \$1.50½; 22°, \$1½ @ \$2, according to make and quantity. Nitric acid, 36°, \$3.¼ @ \$4.½; 38°,

Wm. T. SMITH

"Phone Brown 313"

JAMES IRVING

**SMITH & IRVING,**  
(FORMERLY, W. T. SMITH & CO.)

**Gold Refiners and Assayers.**

Our silver amalgam for replating copper plates is being extensively used by millmen. It avoids the necessity of sending plates long distances to be replated. For sale in small quantities, 50c per ounce, a reduction being made on all orders over 20 ounces. Experience proves our silver amalgam will catch more gold than when the copper is electrolyzed. Our Mr. Smith owned and operated Smelting, Refining and Chemical works in Providence, R. I., for over 20 years.

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Los Angeles, Cal.

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San Francisco, Cal.



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A. J. BECKLEY & CO.

Works Garwood, N. J.

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**FOR SALE:** Second-Hand 10 Stamp Mill Complete.  
Second-Hand 14-24 inch Corliss Engine.

311 Folsom Street, San Francisco, Cal.

**Chas. P. Grimwood,**  
Mining Engineer AND Metallurgist

Laboratory, 214, Pine Street

SAN FRANCISCO, CAL.

\$3.50 @ \$4.40; 40° \$3.75 @ \$4.67½; 42°, \$4.46 @ \$5.00. Oxalic acid, \$6.50 @ \$7.00. Mixed acids, according to mixture. Sulphuric acid, 66 per cent., \$1.00 @ \$1.65. Chamber acid, 50° \$6.50 @ \$7.00 per ton at factory. Blue Vitriol, \$3.50 @ \$4.00 according to grade and order.

## BRIMSTONE.

Demand continues moderate. No arrivals are noted, and prices are about as last quoted. Best unmixed seconds, \$24.50 for spot, while thirds are \$23 @ \$23.50 per ton, respectively.

## MURIATE OF POTASH.

We quote per 100 lbs. on basis of 80 per cent., as follows: New York and Boston, \$1.75 for 80@85 per cent., and \$1.78c for 95 per cent.; Norfolk and Philadelphia, \$1.76½ for 80@85 per ct., and \$1.79½ for 95 per cent.; Charleston, Savannah, Wilmington, N. C. and New Orleans, \$1.78½ for 80@85 per cent., and \$1.81½ for 95 per cent. All for lots of 50 tons and upward.

## KAINT.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12.4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, \$8.55 for New York and Boston; \$8.90 for Norfolk, and \$9.05 for Charleston, Savannah, Wilmington, N. C. and New Orleans. Actual weights, ex vessel at port of importation are quoted \$8.80, \$9.15 and \$9.30, respectively.

## NITRATE OF SODA.

Market is still high, and sales of spot nitrate are quoted at \$1.90, but the quotations are up to \$2 per 100 lbs.; futures range from \$1.55 upward.

## FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, April 14th, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	April 7.	April 14.	Changes.
Gold—	\$175,688,306	\$179,554,085 L	\$2,865,780
Silver—	7,313,428	6,525,167 D	-787,321
Legal Tenders—	37,454,711	37,387,983 L	-133,272
Treas'y Notes—			
etc.—	3,621,734	3,491,246 D	-130,488
Totals—	\$225,078,179	\$227,169,422 D	\$2,091,243

Treasury deposits with national banks amounted to \$31,150,895, an increase of \$492,887 during the week.

## Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month.	1898	1897	1896
	Cents.	Cents.	Cents.
January—	55.77	64.67	67.63
February—	66.07	66.67	67.63
March—	54.90	63.06	68.40
April—		61.85	67.92
May—		60.42	67.78
June—		60.10	68.69
July—		59.61	68.75
August—		54.19	67.34
September—		55.24	65.68
October—		57.57	66.05
November—		57.91	64.93
December—		58.01	65.24
Year—	59.79	67.75	

## Gold and Silver Exports and Imports.

At all United States ports, March, 1898, and years from January 1st, 1898 and 1897:

Coin and Bullion	In Ores			
Exp.	Imp.	Exp.	Imp.	
Gold—				
1898	\$658,834	\$30,200,265	\$69,873	\$471,713
1897	4,244,490	41,151,920	72,341	2,979,503
	1,250,709	1,885,487	89,998	1,046,996

Silver—						
March	3,996,818	445,352	7,695	1,768,829	1897	1898
	12,011,545	1,369,701	53,839	5,419,348	Silver dollars.....	\$1,265,368
1897	13,575,399	2,120,239	246,700	4,962,284	Silver bullion.....	106,486
					Gold bullion.....	158,864
					Totals.....	\$1,610,718
						\$734,145

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

Shipments of specie from San Francisco by water in March included \$3,525,428 in gold coin to New York; \$3,716, in gold and \$163,674 in silver to China; \$219,100 in silver to India; \$7,600 in silver to Central America; \$19,814 in silver to New York; a total of \$3,529,144 gold and \$410,188 silver. Of the silver, \$35,464 was in Mexican dollars (all to China), \$11,810 in Peruvian silver, and \$362,924 in bar silver. For the three months ending March 31, the exports were as follows:

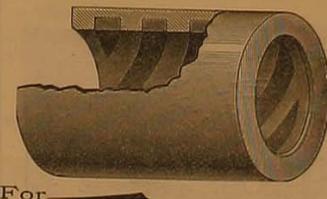
Gold	Silver	Total
To Hong Kong.....	\$9,656	\$1,357,293
To Shanghai.....		28,300
To India.....		320,100
To Honolulu.....	95,000	2,000
To Central America.....	12,660	23,940
		36,600
Total foreign.....	\$117,316	\$1,731,633
To New York.....	13,600,880	19,995
		13,480,776
Totals.....	\$13,578,197	\$1,751,629
1897.....	11,981,662	3,278,393
		15,299,455

The exports of Mexican dollars was very light this year, having been \$35,464 in March, and \$621,893 for the three months against \$184,238 and \$1,427,149 respectively in 1897.

Receipts of specie from Mexico at San Francisco, principally by rail, for the quarter ending March 31st were as follows:

The Baker & Adamson Chemical Co.  
MANUFACTURERS OF  
Strictly Chemically Pure Acids and  
Chemicals and Ashless Filter  
Papers  
EASTON, PENNSYLVANIA

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Rope Tramways, HOISTING  
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Cam Shafts in STAMP  
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RUNS WITHOUT OIL

The Graphite  
Lubricating Company  
BOUND BROOK, N. J.

## FOUNDRY

## Mining Machinery

Iron and Brass Castings of all  
kinds, Shoes and Dies, Pumps,  
Engines, Boilers, Stamp Mills,  
etc., etc. Machinists and  
Foundrymen.

Standard Iron Works,  
PHOENIX, Arizona

A. F. JUDSON, E.M.  
Geologist and Mining Engineer,  
Mines Examined and Reported on.

COLTON, CALIFORNIA

## A. A. WARREN

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ANALYTICAL CHEMIST

COLTON, CALIFORNIA

Manufactured by the Denver, Col.  
Western Chemical Co. For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Refined Sulphate of Soda, Etc.

## Sulphuric Acid

ASSAYERS AND CHEMISTS  
WADE & WADE

Best and Oldest Establishment in Southern Cal.

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## THE JOHANNESBURG SAMPLING WORKS

Purchasers of Gold, Silver, Copper and Lead Ores and Concentrates

Cash Returns Made Within Twenty-four hours after receipt of Ore.

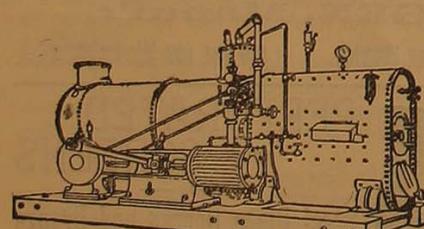
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Glassware and Porcelain Ware, Magnifying Glasses, Thermometers, Altitude Barometers, Compasses, and Microscopes, Wholesale and Retail.

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Pacific Optical Company, 245 S. Spring St., Los Angeles, Cal.

Engines  
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Write for Catalogue and Prices. RUSSELL & CO. PORTLAND, OREGON.

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One 36'x84" Water Jacket Furnace, Boiler, Engine Blower, Rock Breaker, Scales, Shafting, Pulleys, Belting, Tools and all fittings and fixtures complete and new, built by Frazer & Chalmers; also one 16x42 Hamilton Corliss Engine; one 12x20 double Cylinder Hoisting Engine. Will be delivered f. o. b.

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Chemist to the Board of Health of the City of Spokane. All Assays guaranteed to check with United States Mint.

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## MINING STOCK QUOTATIONS

## BOSTON

Acina Con.	4 00	Humboldt	
Allisons	—	Kearns Steel	40 00
Anaconda	—	Merced	17 00
Arnold	3 00	Lake Sup Iron	—
Atlantic	22 00	New Idria Mg.	4 75
Bonanza	—	Napa Cons	8 50
Boston and C. C.	—	Old Dominion	20 25
Boston & Mont'g	135 1/2	Oscoda	34 50
Butte & Boston	20 25	Pioneer	5 06
Calumet & Hecla	45 00	Quarry	110 1/2
Centennial	15 50	Rancho San Ysabel	—
Central	—	Rebel Mt.	2 00
Dominion Coal	21 50	Little Butte	15 Val Verde
Dominion Pref.	104 00	Lucky Star	1 00 Wedge
Franklin	—	Magganetta	02
Gold Coin	2 00		

## NEW YORK.

Alamo	03 1/2	Homestake	28 50
Alice	40	Iron Silver	—
Annetta	45	Mexican	30
Bess & Belcher	60	Mollie Gibson	19
Bruinwick	05	Ophir	4 50
Bulwer	—	Pharmacist	10
Crown Point	65	Plymouth	—
Crus. Cal. & Va.	—	Quicksilver	3 00
Cripple Creek Con	08 1/2	Quicksilver pfd	11 00
Deadwood	—	Ridgefield	—
Favorite	11 25	Sierra Nevada	—
Fortuna	05	Standard	1 60
Golden Fleece	45	Union Con.	—
Gould & Curry	45	Yellow Jacket	—
Hale & Norcross	—		

## COLORADO SPRINGS STOCKS

Alamo	03 1/2	Isabella	30
Anaconda	48	Iowa	—
Argentum Juani	20	Jack Pot	05 1/2
Bankers	04 1/2	Jefferson	06 1/2
Ben Hur	02 1/2	Jeffrey	23
CK & N.	00 1/2	Mount Rosa	—
CC & Manito	—	Pharmacist	09 1/2
Crede & Co.	—	Portland	70
Co. Consolidated	09	People's	02 1/2
Garfield Grouse	04	Sacramento	02
Golden Fleece	30	Star of the West	—
Gold & Globe	—	Union Gold	22
Gold Standard	03 1/2	Virginia M.	02 1/2
Insonclad	300	Work	05

## LOS ANGELES, CAL.

## SAN FRANCISCO.

Alpha	—	Exchequer	—
Alta Con.	10	Gould & Curry	1 85
Andes	24	Hale & Norcross	1 85
Belcher	23	Justice	55
Bell	35	Monte Carlo	39
Bodie	10	Overman	80
Bullion	26	Potosi	46
Challenge	10	Savage	28
Chollar	85	Sierra Nevada	67
Confidence	1	Union Con.	07
Con. Cal. & Va.	1	Utah	—
Crowe Point	17	Yellow Jacket	03

## SALT LAKE CITY

Alice	65	Lucky Bill	—
Ajax	38	Malvern	—
Alliance	15	Mammoth	2 00
Anchor	50	Maxfield	—
Buckeye	01	Mercer	8 15
Bull, Beck	5 80	Morgan	10
Cent. Bureka	23	Northern Light	29 1/2
Chloride Point	50	Omaha	20
Dalton	01 1/2	Overland	65
Daly	70	Richmond Ana.	—
Daily West	4 00	Richmond Ana.	—
Dalton & Lark	02	Seconda	03 1/2
Dexter	1 20	Rover	15
Eagle	05	Sacramento	45
Breka Hill	70	Silver King	16 75
Fouaces	09	Silcox Con.	—
Galena	65	Sunbeam	07
Gemini	27	Sunshine	27
Geyser Marion	1 02 1/2	Swanson	1 80
Grand Central	1 95	So Swanson	1 25
Horn Silver	01	Utah	55
Little Pittsburg	1 30	Utah Con.	—

## ROSSLAND, BRITISH COLUMBIA.

## Bi-Metallic

Alberta	05 Josie Mac	12 1/2
B. C. Gold King	07 Josie	38
Big Three	10 Jumbo	75
Bird	07 Kootenay London	10
Britte	10 Le Roi	8 00
Britton	01 1/2 Lilly May	18
California	02 Mabel	15
Camp Bird	05 Monita	18
Celtic Queen	05 Monte Christo	18
Centre Star	05 Morning Star	19 1/2
Colonna	24 Mugwump	03
Commander	18 Nest Egg	05
Deer Park	12 Northern Belle	10
Della Colla	02 Novelty	09
Delaware	12 O. K.	05
Enterprise	20 Palo Alto	10
Erie	05 Phoenix	13 1/2
Eureka Con	03 1/2 Forman	10
Evening Star	02 1/2 R. E. Lee	15
Erhardt	10 1/2 Red Eagle	06
Golden Drip	15 Ross'l d' H'mest'k	05
Good Hope	03 1/2 Rossland, Red Mt.	20
Grand Price	03 1/2 St. Elmo	08
Great Western	08 St. Paul	12 1/2
Hattie Brown	— Silver Bell	04
Hele	04 Silverine	—
High Ore	10 1/2 So Cross & W. Con	20
Imperial	10 Virginia	12
Iron Horse	20 War Eagle Con	1 00
Iron Mask	38 West Le Roi	21
I. X. L.	10 White Bear	11

## DENVER STOCK REPORT.

Aetna	00 1/2	Elkton	92
Alamo	02 1/2	Eureka	00 09
Anaconda	42	Gaudiel Grouse	01
Arctia	00 1/2	Golden Fleece	25
" Consolidated	01 1/2	Goldsmith	00 1/4
Argentum Junta	27	Gold Standard	—
Asa	27	Insey	00 03
Bangkok-C. Bell	02	Iron Clad	02 1/2
Bankers	04	Isabella	28 1/2
Ben Hur	02 1/2	Jack Pot	04 1/2
Bolt Lee	04	Jefferson	08 1/2
Boston & C. C.	01 1/2	Mollie Gibson	70
Brockazoo	00 2	New Zealand	05 1/2
C. K. & N.	00 8	People's	01 1/2
Colo. C. & M.	01 1/2	Pharmacist	08 1/2
C. C. Con.	06 1/2		

## HELENA, MONTANA

Am Den & M. Co.	1 00	Helena & Frisco	8 00
Bald Butte	2 50	Iron Mountain	—

## MEXICO

Name of Company	State	Price
Alianza	Hidalgo	5
Amistad y Concordia	Guerrero	24
Arevalo y Anexas	Hidalgo	710
Asturiana y Anexas	Zacatecas	200
Barradon y Cabras	Durango	300
Bartolome de Medina	Hidalgo	100
Cabezas y An.	Zacatecas	120
Candelaria de Pinos	"	100
Candelaria de Chalchihuitán	Durango	150
Capuznaya	Tepic	30
Carmen	Hidalgo	100
Castellana y San Ramón	Chihuahua	80
Cerro Colorado	Guerrero	80
Cinco Señores y An.	Guerrero	20
Concepcion y Anexas	S. Luis Potosí	20
El Oro	Guerrero	100
Epigmenio y An.	Guerrero	100
Franco	Hidalgo	100
Guadalupe	Hidalgo	100
St. Maria de la Paz	S. Luis Potosí	720
S. Luis Potosí	Durango	30
Sirena	Hidalgo	480
Soledad	"	200
Trinidad	Guerrero	50
San Rafael y Anexas	"	100
do Free Stock	"	125
San Rafael del Oro	Hidalgo	100
St. Maria de la Paz	S. Luis Potosí	720
Stimson Blk.	Los Angeles, Cal.	Chas. Wier Manager, see
Opposite Natick House,	Los Angeles	
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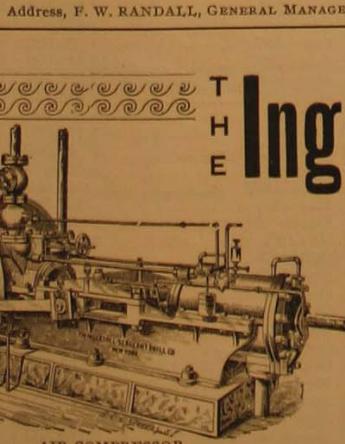
NOTE.—The above Mexican stocks are figured on the basis of Mexican silver.

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MANUFACTURERS OF AND DEALERS IN  
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COMPRISING  
Briggs' 2-Stamp Triple-Discharge Quartz Mill, of Latest Improved Pattern, Rock Breakers, Ore Feeders, Concentrators, Engines and Boilers, Hoisting Rigs to be operated by Horse, Steam Power or any other motor; Cars and Ore Buckets, Centrifugal and Jack-head Pumps, Triple-acting Pumps, Centrifugal Sand and Gravel Pumps, Wooden Tanks and Pumps for the Cyanide Process, Pipe and Gate Valves, Link Chain Elevators for elevating and conveying all kinds of material. Estimates as to cost of machinery and its erection furnished upon application. Write for Catalogue and Prices.

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The Boston Pantasma Milling and Mining Co.  
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Will Mill and Concentrate all kinds of Gold and Silver Ore. Rates Reasonable and High Percentage Guaranteed.



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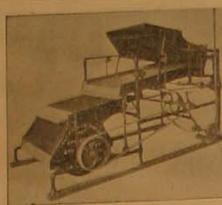
New York City



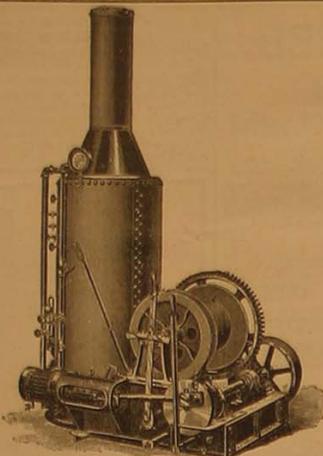
ROCK DRILLING

## INCORPORATED MINES PAYING DIVIDENDS.

NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Sept 1897	\$ 110,000	Q.
Adams	Colorado	150,000	1,500,000	10	.04	October 1895	693,500	S, L, C.
Alaska, Treadwell	Alaska	200,000	5,000,000	25	35½	October, 1897	3,250,000	G.
Alaska Mexican	Alaska	200,000	1,000,000	5	.10	Oct., 1897	297,031	G.
Alice	Montana	400,000	10,000,000	25	.03	Oct 1897	1,055,000	G.
Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1897	3,750,000	C.
Anchoria Leland	Colorado	600,000	600,000	1	.01	Oct 1897	84,000	G.
American Gold	Colorado	300,000	3,000,000	10	.02	Aug 1897	273,000	G. S. I.
Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1897	740,000	S.
Bald Butte	Montana	250,000	250,000	1	.03	Sept 1897	512,500	G. C. S.
Bangkok C-Bell	Colorado	600,000	600,000	1	.01	July 1896	107,510	S. L. C.
Big Six	Colorado	500,000	500,000	1	00½	April 1897	5,000	G. S.
Boston & Montana	Montana	150,000	3,750,000	25	.03	Aug 1897	6,275,000	G. C. S.
Bullion Beck and Champion	Utah	100,000	1,000,000	10	.50	Mar 1897	2,465,000	G. S.
Bunker Hill and S	Idaho	300,000	3,000,000	10	.05	Oct 1897	324,000	S. L.
Cariboo	British Col.	80,000	800,000	1	.02	May 1897	156,965	G.
C. O. D.	Colorado	50,000	500,000	1	.01	March 1896	25,000	G.
Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct. 1897	50,850,000	C.
Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
Central Lead	Missouri	4,000	400,000	100	1 00	Oct 1897	16,000	L.
Charleston	South Car.	10,000	1,000,000	100	1 00	Feb 1897	150,000	.....
Champion	California	34,000	340,000	10	.25	Aug 1897	278,200	G.
Consolidated, California and Virginia	Nevada	216,000	21,600,000	100	.25	March 1895	3,592,800	G. S.
Copper Queen Consolidated	Arizona	200,000	2,000,000	10	.25	June 1895	1,910,000	C.
Crescent	Utah	24,000	600,000	25	.....	July 1897	280,000	.....
Daly	Utah	150,000	3,000,000	20	.25	Mar 1897	2,925,000	S. L.
Deadwood Terra	Dakota	200,000	5,000,000	25	.40	June 1897	1,320,000	G.
De Lamar	Idaho	400,000	2,000,000	5	.25	Jan 1897	2,250,100	S. L.
Della S.	Colorado	1,000,000	1,000,000	1	.10	Jan 1897	60,000	G.
Doe Run	Missouri	5,000	500,000	100	.50	October 1897	.....	L.
Dalton and Lark	Utah	2,500,000	2,500,000	1	00½	August 1896	87,500	S. L.
Elkton Consolidated	Colorado	1,250,000	1,250,000	1	.03	Sept 1897	361,960	G. S.
El Paso	Colorado	650,000	650,000	1	.01	Aug 1897	5,393	G. S.
Florence	Montana	500,000	2,500,000	5	.01	May 1897	132,530	S.
Galena	Utah	100,000	1,000,000	10	.05	Jan 1897	71,000	G. S. L.
Garfield Grouse	Colorado	1,200,000	1,200,000	1	.01	Feb. 1897	24,000	G.
Geyser Marion	Utah	300,000	1,500,000	5	.03	Nov 1897	54,000	G.
Golden Eagle	Colorado	1,000,000	1,000,000	1	.01	Sep. 1896	10,000	G.
Golden Fleece	Colorado	600,000	600,000	1	.01	Feb. 1897	569,179	G. S.
Gold Coin	Colorado	200,000	1,000,000	5	.05	Aug 1897	150,000	G. S.
Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,625	G.
Hecla Consolidated	Montana	30,000	1,500,000	50	.50	Feb 1897	2,175,000	S. G. L. C.
Helena & Frisco	Idaho	500,000	2,500,000	5	.04	August 1896	475,000	S. L.
Higiland	S. Dakota	100,000	10,000,000	100	.20	Oct 1897	3,424,918	G.
Holy Terror	S Dakota	300,000	300,000	1	.03	Sept 1897	18,000	G.
Homestake	Dakota	125,000	12,500,000	100	.25	Oct 1897	6,431,250	G.
Hope	Montana	100,000	1,000,000	10	.10	Nov 1897	732,252	S.
Horn Silver	Utah	400,000	10,000,000	25	12½	January 1896	5,080,000	S. L.
Idaho	Brit. Col.	500,000	500,000	1	.05	Mar 1887	152,000	.....
Iowa	Colorado	1,000,000	1,000,000	1	00½	Oct 1897	65,000	G.
Iron Mountain	Montana	500,000	5,000,000	10	.01	Sept 1897	497,500	S.
Isabella	Colorado	2,250,000	225,000	100	00½	June 1897	270,000	G.
Kearsarge	Michigan	40,000	1,000,000	25	.10	Aug 1897	160,000	C.
Last Chance	Brit. Col.	500,000	500,000	1	.04	Jan 1897	42,000	S. L.
Le Roi	British Col.	500,000	2,500,000	5	.10	Oct 1897	625,000	G.
Minnesota	Minnesota	165,000	16,500,000	100	1 50	July 1896	3,240,000	I.
Montana Ore Purchasing	Montana	40,000	1,000,000	25	.01	October 1897	640,000	.....
Moose	Colorado	600,000	600,000	1	.01	January 1896	186,000	G.
Morning Star	California	2,400	240,000	100	8 00½	Sept. 1897	558,600	G.
Mt. Rosa	Colorado	1,000,000	1,000,000	1	00½	Oct. 1896	30,000	G.
Mercur	Utah	200,000	5,000,000	25	12	Oct 1897	825,000	G.
Mammoth	Utah	400,000	10,000,000	25	05½	Nov. 1896	1,150,000	G. S. O.
Moon Anchor Gold	Colorado	600,000	600,000	1	.02	Nov 1897	63,000	G.
New Elkhorn	Colorado	300,000	1,500,000	5	.24	Sep. 1896	72,000	G.
New York & Hon. Rosario	Central A.	150,000	1,500,000	10	.10	Oct. 1897	832,500	S. G.
Napa	California	100,000	700,000	7	.20	Oct 1897	870,000	Q.
New Idria Quicksilver	California	100,000	500,000	5	.10	Sept 1897	20,000	Q.
Ontario	Utah	150,000	15,000,000	100	.01	June 1897	13,445,000	S. L.
Osceola	Michigan	50,000	1,250,000	25	1 00	June 1897	2,172,500	C.
Parrot	Montana	230,000	2,300,000	10	.08	June 1897	1,656,122	C.
Pennsylvania Consolidated	California	51,500	5,150,000	10	.05	Sept 1897	20,750	.....
Portland	Colorado	3,000,000	3,000,000	1	01½	Oct 1897	1,163,000	G. S.
Princess	Colorado	1,000,000	1,000,000	1	00	Feb 1897	45,000	G.
Quincy	Idaho	100,000	2,500,000	25	4 00	August 1897	9,470,000	C.
Rambler-Cariboo	Brit. Col.	1,000,000	1,000,000	1	.02	April 1897	40,000	.....
Reco	Brit. Col.	1,000,000	1,000,000	1	50½	May 1897	187,500	S. L.
Sacramento	Utah	1,000,000	5,000,000	5	.00	March 1897	22,000	G.
Small Hopes Consolidated	Colorado	250,000	5,000,000	20	.10	Mar 1896	3,275,000	S.
South Swansea	Utah	150,000	150,000	1	.05	Oct 1897	59,960	S. L.
Standard	California	200,000	20,000,000	100	.10	Sept 1897	3,757,868	G. S.
St. Joseph	Missouri	250,000	2,500,000	10	.15	Oct 1897	24,000	L.
Silver King	Utah	150,000	3,000,000	.20	.25	October 1897	1,237,500	S. L. G.
Slocan Star	Brit. Col.	2,000,000	1,000,000	.50	.05	Mar 1897	350,000	.....
Smuggler Union	Colorado	50,000	5,000,000	100	1.00	Oct 1896	150,000	G. S.
Swansea	Utah	100,000	500,000	5	.05	Oct 1897	61,500	S. L.
Tom Boy	Colorado	200,000	2,000,000	10	.20	March 1896	410,000	G.
Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1897	4,950,000	C.
Union	Colorado	1,250,000	1,250,000	1	.01	June 1896	73,000	S.
United Verde	Arizona	300,000	3,000,000	10	.25	December 1893	562,500	C.
Utah	Utah	100,000	1,000,000	20	.02	Feb. 1897	175,000	G. S.
Utah Consolidated	Utah	80,000	150,000	5	.02	Sept. 1896	3,000	S. L.
Victor	Colorado	200,000	1,000,000	5	.05	March 1897	765,000	G.
Western Mine Enterprise	Montana	500,000	500,000	1	.10	Mar 1897	12,000	.....
War Eagle	British Col.	500,000	500,000	1	.08	October 1896	187,000	.....

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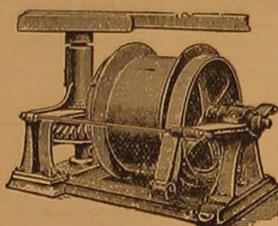
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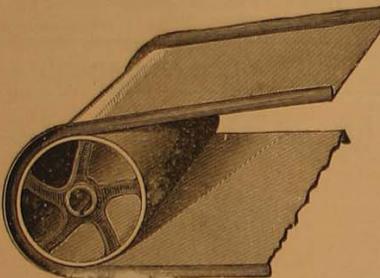
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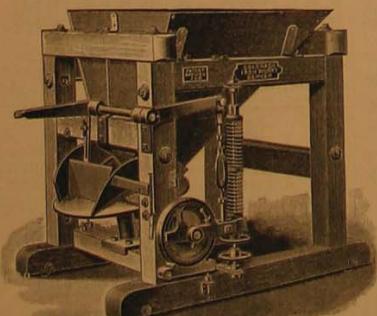
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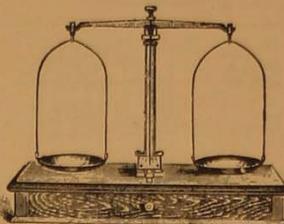
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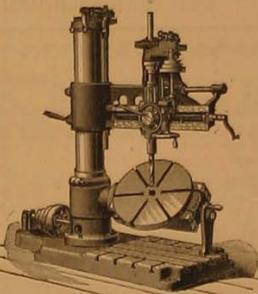


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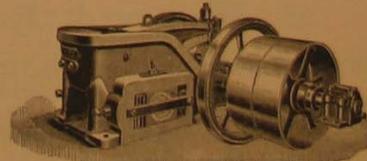
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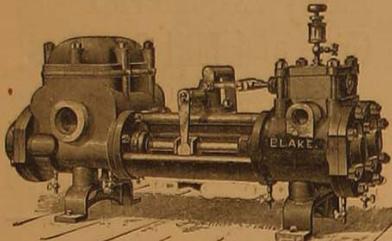
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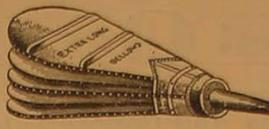
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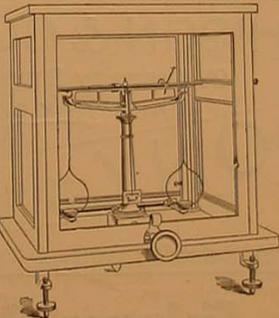
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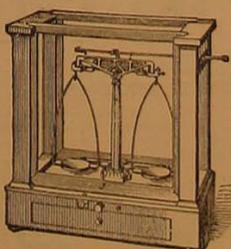
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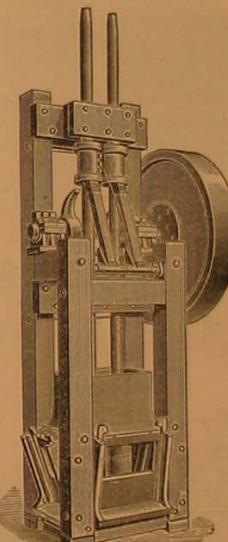
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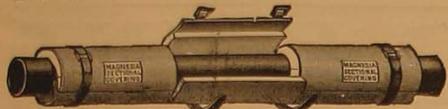
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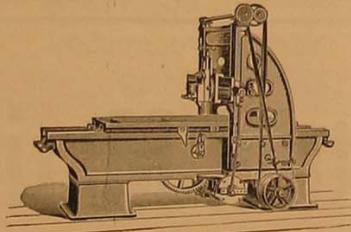
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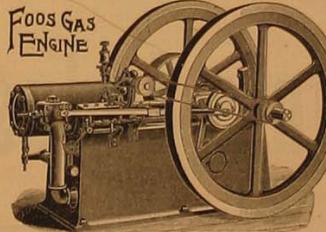
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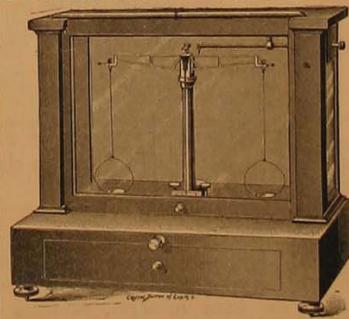
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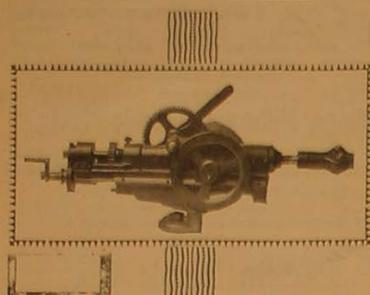
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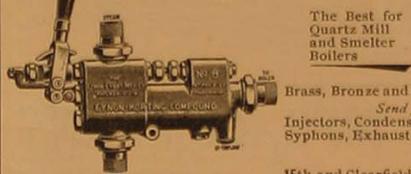
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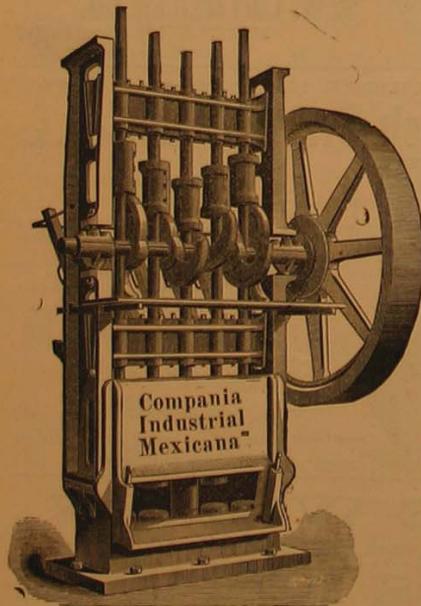
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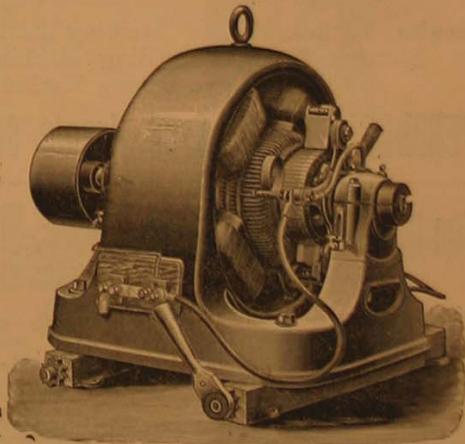
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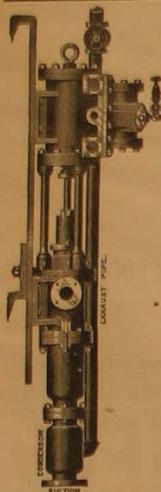
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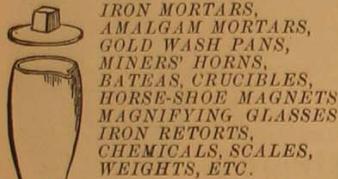
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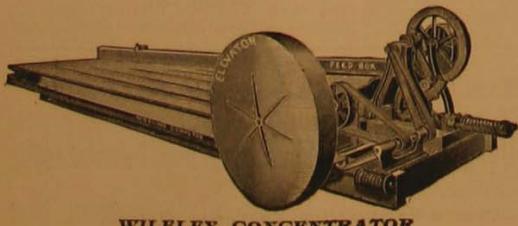
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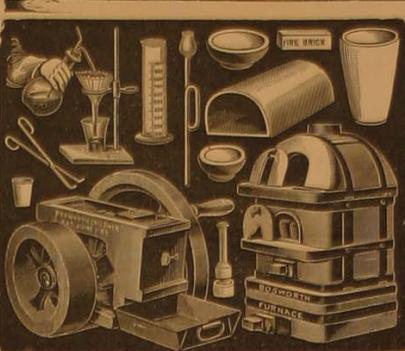


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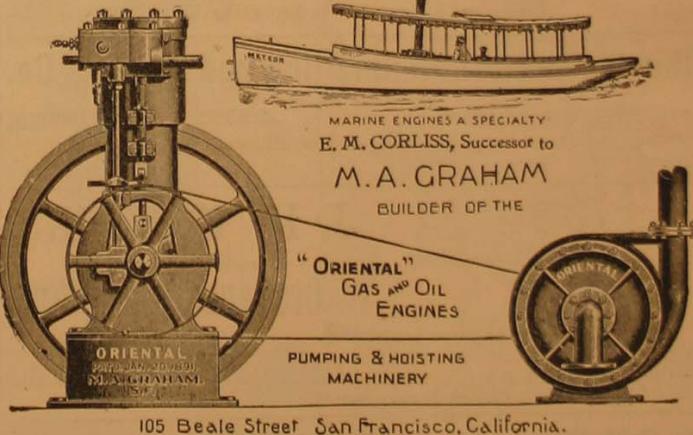
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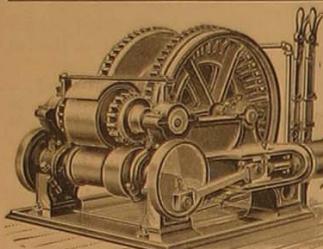
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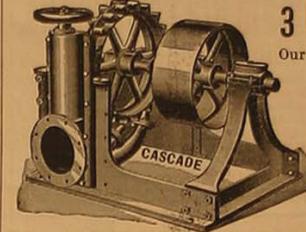


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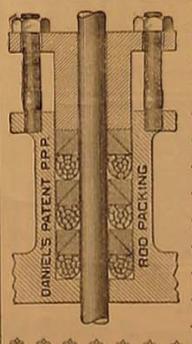
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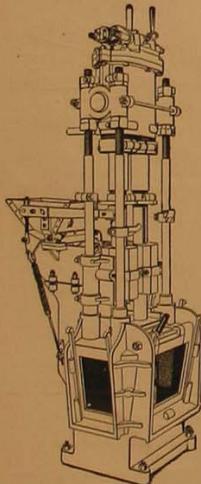
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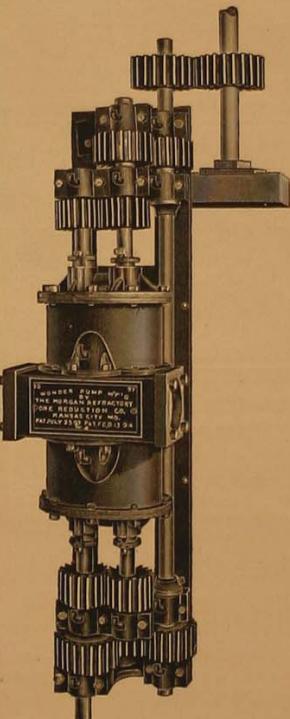
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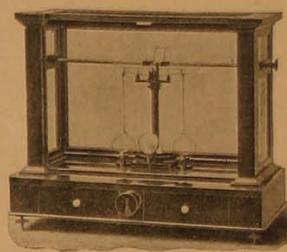
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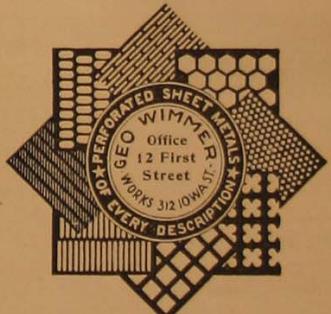


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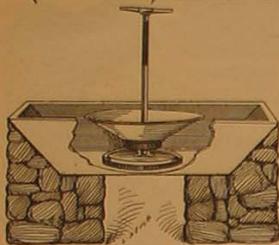
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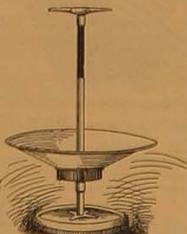
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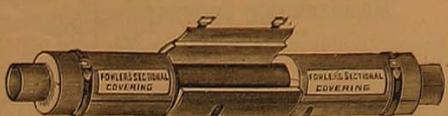
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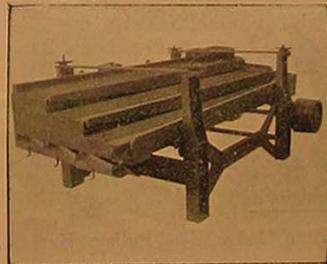
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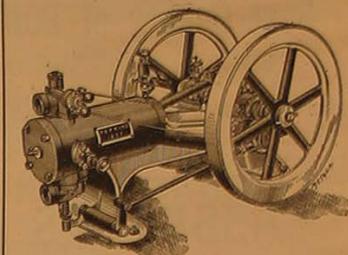
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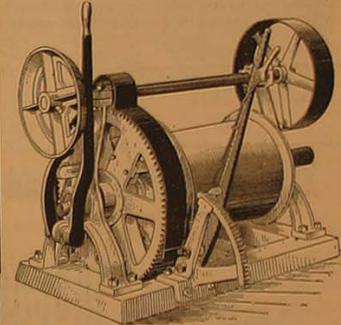
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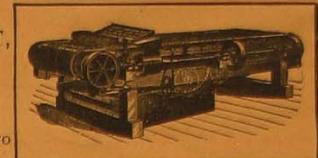
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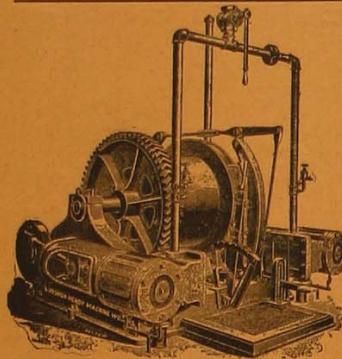
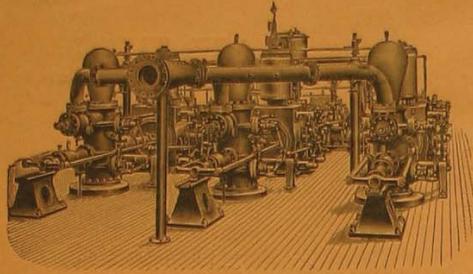


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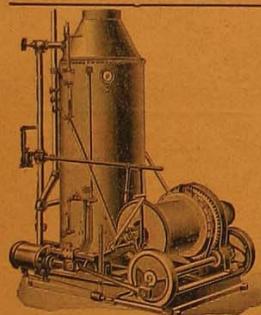
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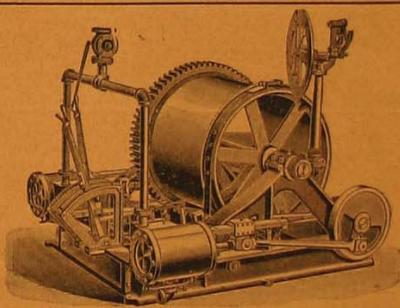
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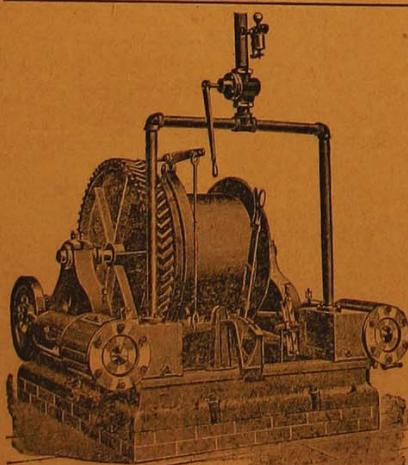
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